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In 1898 the American Mining Congress was organized to serve the nation's mineral industries. Through thirty-eight consecutive years of service its effectiveness has mounted in ever-widening circles. Today it stands the bulwark of a coordinated mining industry.

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The Mining Congress Journal

Julian D. Conover, Publisher

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Harry L. Moffett

Vol. 23

MARCH, 1937

Number 3

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Published monthly. Yearly subscription, United States and Canada, \$3.00. Foreign, \$4.00. Single copies, \$0.30. Entered as Second Class Mail Matter, January 30, 1915, at the Post Office at Washington, D. C.

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THE AMERICAN MINING CONGRESS

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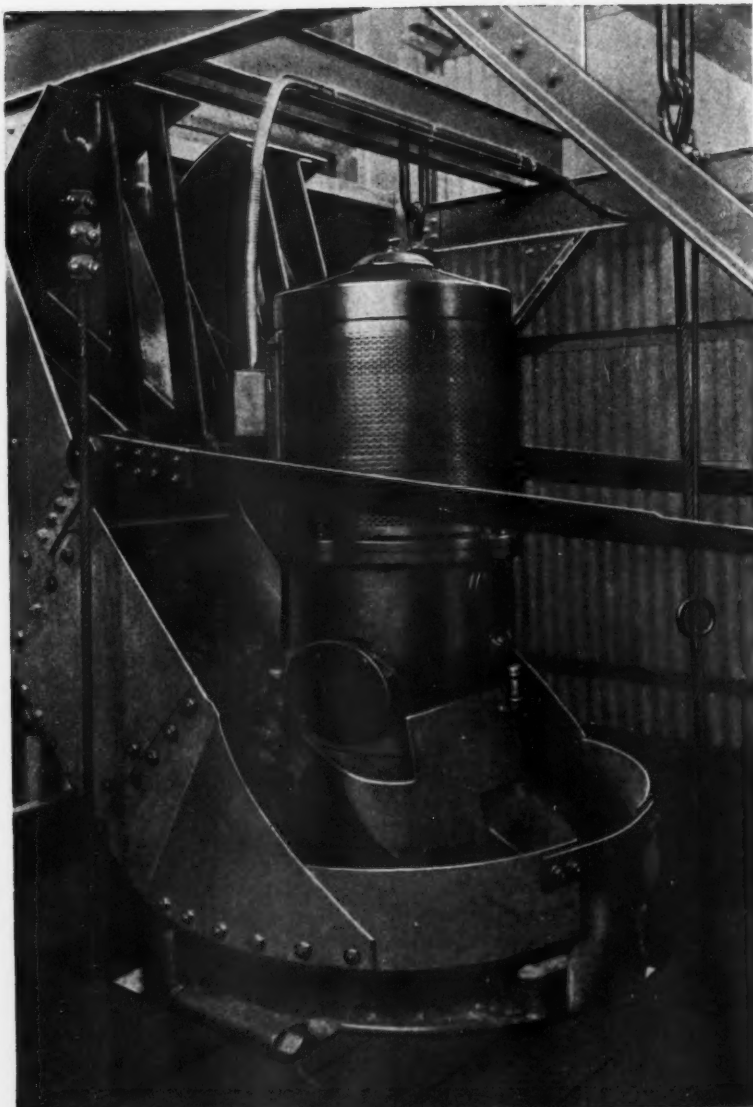
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MARCH, 1937

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The feed to the crusher during the test was minus 5" plus 2". The product discharged from the 10" Newhouse contained over 98% of material minus 1" and only 6% of fines—1/8" indicating very little dust.

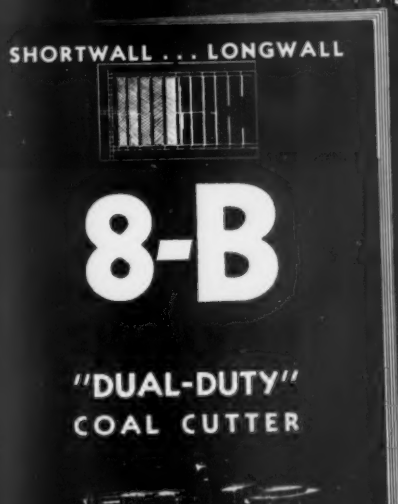
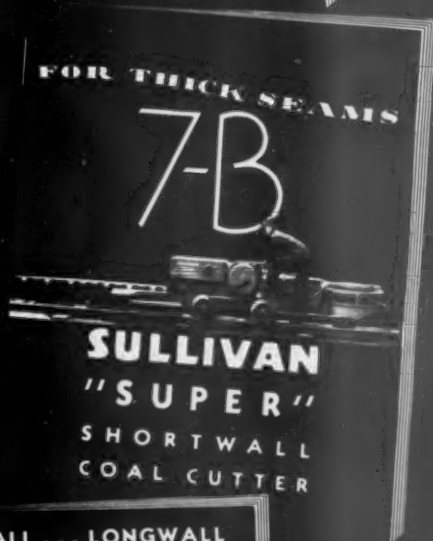
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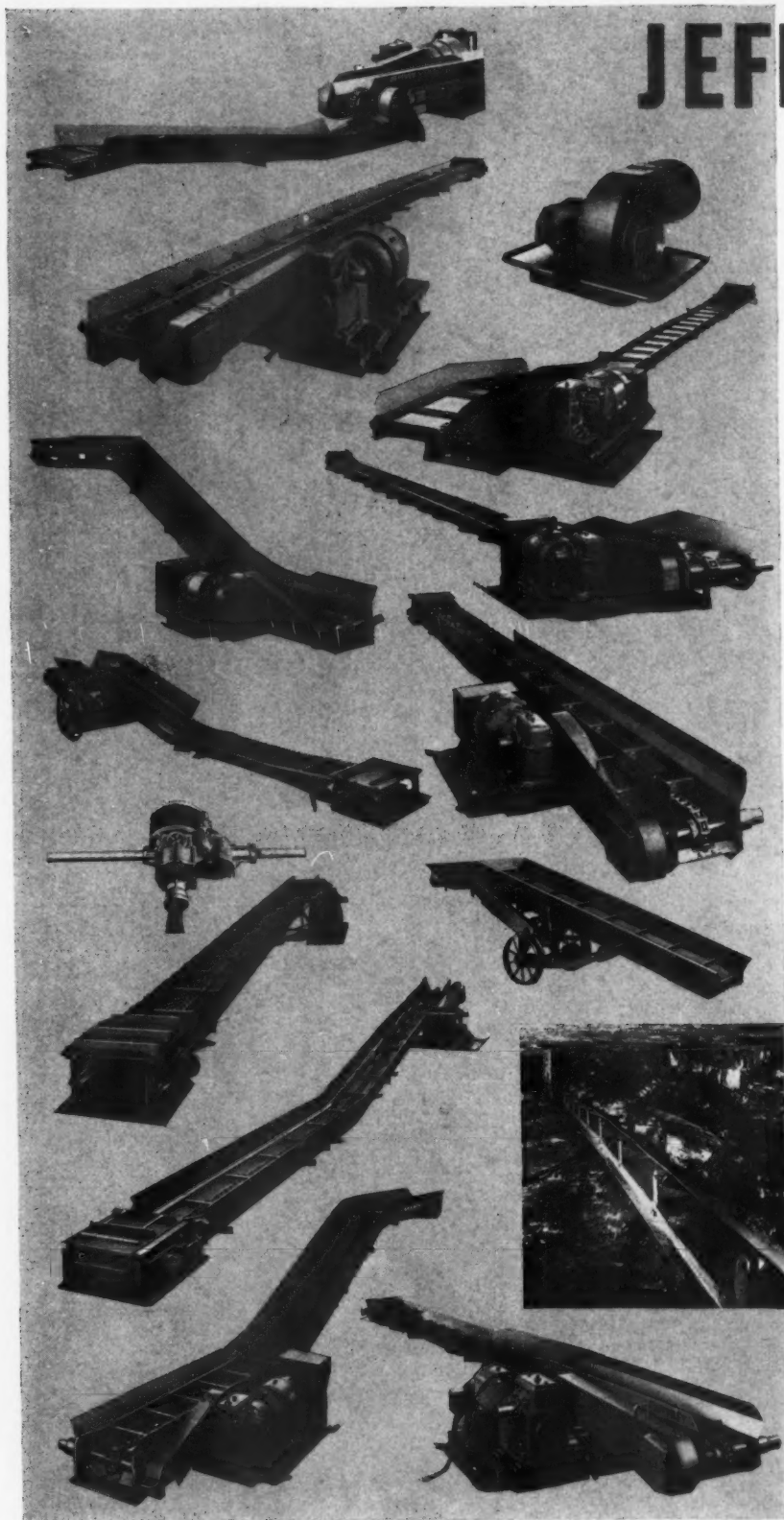
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MARCH, 1937

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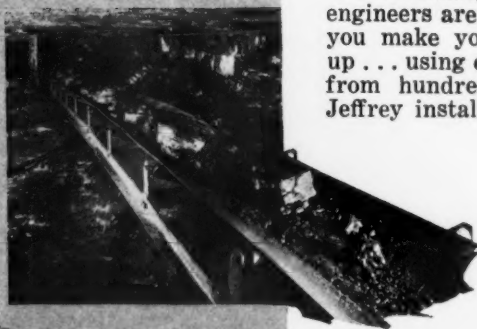
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THE MINING CONGRESS JOURNAL

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A G-E engineer will be glad to look over your plant, and if savings are possible, help you to select the proper equipment. Call the nearest G-E office, or write General Electric, Schenectady, New York.

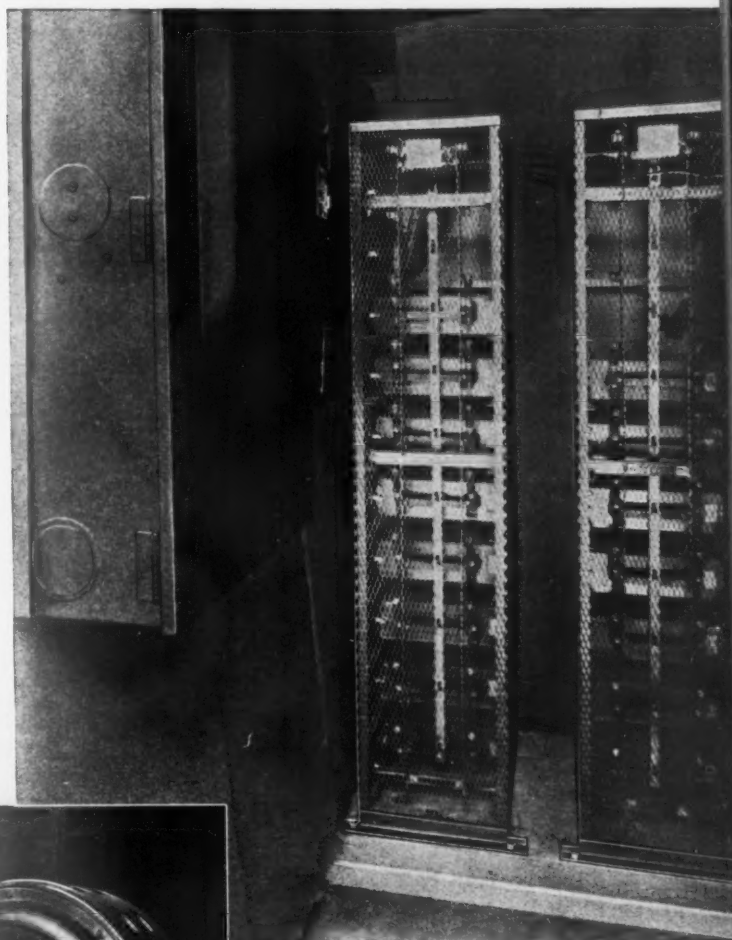
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PYRANOL



\$3700 annual saving results from the installation of this G-E synchronous condenser at the plant of the Brooks-Scanlon Lumber Co., Bend, Oregon. Installed cost was \$9200.



These nonflammable G-E Pyranol capacitors are installed at the plant of the Louie Glass Co., Weston, W. Va. The annual return on a \$1545 investment is 54 per cent

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Kanawha Timken-equipped mine cars, belt conveyor and car dump in operation at the Ridgeview Coal Company Mine, L. B. Ramsey, Superintendent.

All new equipment at the Ridgeview Coal Company operates on TIMKEN BEARINGS

The Ridgeview Coal Company, Nellis, West Va., started operation August 15, 1935. At that time the following new equipment went into service: 80 mine cars, belt conveyor system and car dump — all manufactured by the Kanawha Manufacturing Company, Charleston, West Virginia.

Timken Bearings were specified for all of this equipment as a result of the great satisfaction this operator has had with Timken-equipped mine cars at Christian Colliery, Mahan, West Virginia.

Between two and three hundred mine cars have been operating on Timken Bearings at Christian Colliery during the last 8 years without a single bearing failure. To date no delays have been experienced at the Ridgeview Mine due to faulty equipment, and the Timken Bearings are operating with their customary dependability and economy.

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TAPERED ROLLER BEARINGS

MARCH, 1937

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260
TRACK MOUNTED
LOADER**

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The Goodman 260 does its work day in and day out, easily and steadily. In average conditions, production figures up to 500 tons per 7-hour shift are not unusual. Many owners report even higher figures—some, much higher. The success this machine has had is due principally to four reasons:

EFFECTIVE MANEUVERING—The machine is fast and easily operated. The loading head and discharge boom can be swung quickly to the work and moved to the required height. All movements and adjustments are by power, and all controls are within easy reach of the operator.

MECHANICAL EFFICIENCY—The gathering head does its work so thoroughly, even on soft bottom, that but little hand shoveling is required. It handles fine coal or lump coal with speed and efficiency. In tight coal the powerful digging ability of the head is a valuable feature.

TIME LOSSES REDUCED—This machine has the strength and capacity for heavy, continuous duty because of its substantial construction. Inspection and adjustments can be made easily and quickly.

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Goodman manufactures a complete line of cutting machines of both the track-mounted and shortwall types.

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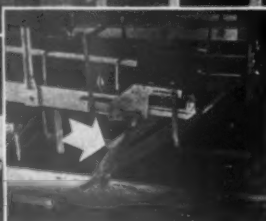
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COAL FROM THE TIPPLE IS FED TO THESE TWO 48-IN. WIDE COARSE COAL RHEOLAVEUR LAUNDERS—Each launder is equipped with two Rheo boxes, middling material and refuse from the first boxes going to a similar rewash launder. Minus 1/4-inch coal goes to a fine-coal Rheolaveur washing unit.



THE PLANT INCLUDES THREE CARPENTER DRYERS—These Type AR-4 Centrifugal Dryers take the 1/4-inch by 48-mesh cleaned coal from the fine coal unit and so reduce the surface moisture that it is a preferred product.



THIS TRANSFER CHUTE ENABLES LOADING TO BE CONTINUED WHILE CARS ARE BEING CHANGED—Arrow indicates automatic transfer chute. When car is loaded, the boom rises, the chute drops and the feed end rotates into position where it receives coal and carries it back to the next car.



COSTS CUT WITH CREOSOTED WOOD (FROM THE WOOD PRESERVING CORPORATION) IN MINE CARS—This photograph shows pre-framed creosoted white oak mine car bottom in an old steel car after two years service. (Creosoted timber is also used in mine car bumpers. It has been estimated that creosoted timber bumpers save from \$10 to \$40 per car over bumpers of other types.)



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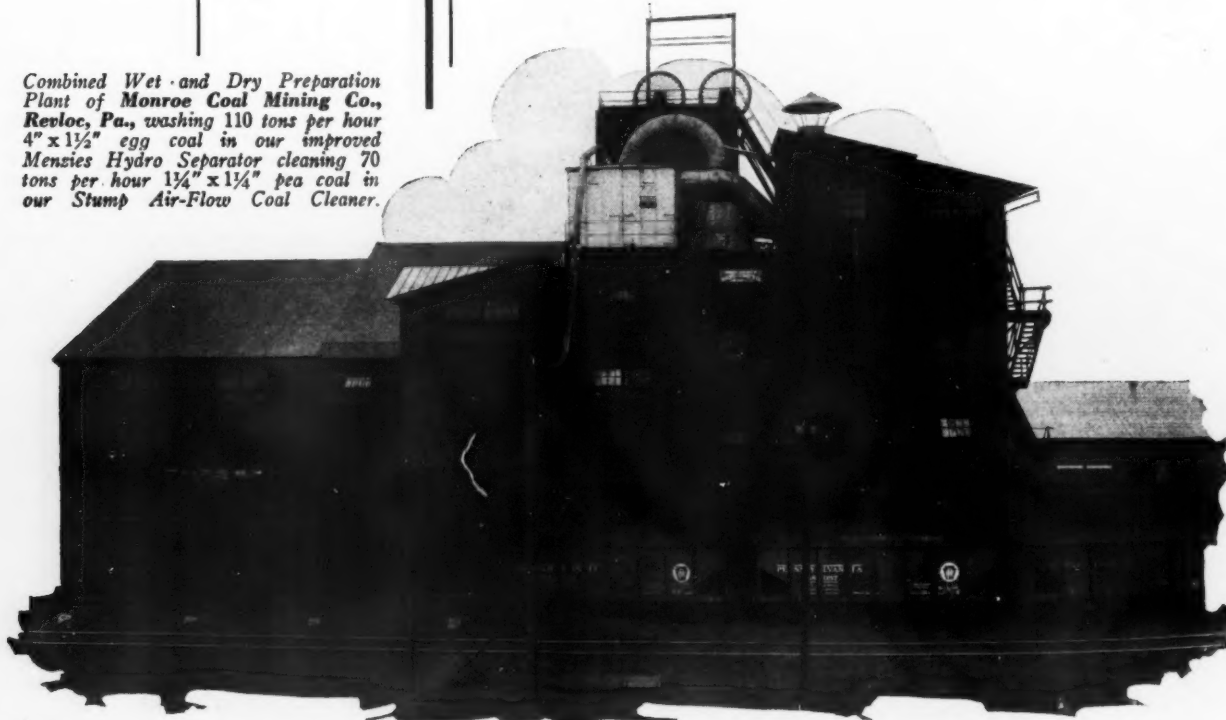
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Combined Wet and Dry Preparation Plant of Monroe Coal Mining Co., Revloc, Pa., washing 110 tons per hour 4" x 1½" egg coal in our improved Menzies Hydro Separator cleaning 70 tons per hour 1¼" x 1¼" pea coal in our Stump Air-Flow Coal Cleaner.



The Trend Toward Autocracy

EVEN in this country there is a distinct trend toward centralization of power in the national government, and toward a centralization of the powers of the Federal Government in the hands of the Executive.

Leaving aside our personal desire for individual independence, for what we call "freedom," there is much that can be said in favor of the efficiency which is possible under centralized control.

While not in accord with our democratic ideals, we could probably exist without Congress and without our several legislatures. One benevolent, intelligent leader, untrammelled by selfish demands, probably could determine the rules to be followed as well as a congress or a legislature hampered by the difficulties of harmonizing individual opinions.

While not agreeing with this contention, it may be argued that the people of the United States, by a large majority, voted to support that theory, and that the democracy, for which we have given so much of human sacrifice, is fast disappearing. It might be said that we are drifting, in the United States, toward autocracy even more rapidly than did either Russia, Italy, or Germany, and that we are unmindful of the increasing velocity of the current and of the Niagara below.

Our hope lies in the intelligence of the American people. When this is once aroused we confidently expect a reversal—and a pronounced reversal—of the present trend and a return to untrammelled representative government; a return to conditions, under which the gaining of voters' support by wide distributions of government or the influencing of the peoples' representatives by special favors or by threats of political reprisals, will be so reprehensible that no one can practice or condone without bringing upon himself the bitter condemnation of his associates and the public generally.

Public sentiment changes rapidly, so rapidly as to justify the inquiry as to whether it is an intelligent public sentiment.

The ideal of today, for no intelligent reason, becomes unpopular tomorrow. The changing attitude of the nation on the subject of prohibition is a non-partisan exhibit of the rapidity with which public sentiment may be changed, and a commanding proof of the necessity for those checks and balances which in the past have preserved representative government. The untrammelled intelligence of the nation, once aroused to our present dangers, will quickly and decisively put an end to the present trend toward concentration of governmental authority.

J. H. Cleeve

The Mining Congress Journal



Vol. 23

MARCH, 1937

Number 3

E. R. COOMBES, Editor

A Journal for the entire mining industry published by The American Mining Congress

Viewing With Alarm

SERIOUS QUESTION has repeatedly been raised by industrial leaders as to the wisdom of certain provisions of the 1936 Revenue Law. Viewed as a matter of expediency it unquestionably has produced results for the Treasury, in the form of increased revenue from dividend checks that were so notable in the closing weeks of the year.

Looked at from the standpoint of the future of industry the picture is not so rosy. The tax upon undistributed profits is much more far-reaching than immediate revenue. It in reality penalizes the thrifty and well managed business, in favor of the uneconomic and poorly managed business. It establishes a distinctly new departure in our national policy and thinking.

A few of its bad effects are (1) business will be unable to accumulate reserves to meet emergencies or insure against future depressions; (2) it will curtail business expansion through the payment in dividends of funds that should be expended for expansion; (3) it may destroy industry's initiative and vigor that have made us the world leaders in industrial advancement.

A Profitable Investment

IN 1868 the United States Government purchased Alaska from Russia for the sum of \$7,200,000. Doubtless that unhappy country was glad to get rid of it. To the end of 1936, according to the Alaskan Branch of the United States Geological Survey, the total value of the mineral output since 1880 was \$722,000,000. This is 100 times the purchase price. Sixty-five percent of this production was gold—placer and lode—and most of the remainder was copper. Minor though encouraging amounts of platinum and tin are being recovered from placers. There are other minerals in the Territory but little is being done with them. The mineral production and wealth of Alaska have been exploited mainly by pioneering prospectors and companies who have spent many millions of dollars in development and equipment—dredges, mills, railways—but the profits have also been big. The output of fish, fur, lumber, and non-metallic minerals has totalled great sums of money. Alaska was certainly a profitable investment for the United States and will continue to be so.

Straws in the Wind

THE PRESIDENT optimistically in his budget message indicates a balanced budget (except for statutory debt retirement) in 1938 and a completely balanced budget in 1939.

And how are we to achieve this highly desirable goal? To accomplish the one—1938 balance—national tax revenue must increase over 1937 estimates by approximately a billion and a half dollars. The Administration obviously is anticipating a continuance of the rapidly rising industrial prosperity, and its corollary, rising tax returns.

Home Made Machinery

EVERY MINING COMPANY must maintain a repair shop. Depending on such things as the size of the mine and its proximity to manufacturers' distributing points, the equipment in these shops varies from a simple blacksmith's forge to heavy machines. In some cases, these well equipped shops are "holdovers" from the days before good roads and when the delivery of new parts required a considerable time; but in most cases they are necessary for maintaining the mine in proper working order.

Machine maintenance and repair requires a considerable amount of skill and the average mine repair shop can make a good many machine parts. In some cases, companies make certain articles instead of purchasing them from the manufacturers because of the fact that their shop force has extra time that can be filled in this way. However, other companies extend this practice to a point where it is questionable whether or not they are actually effecting an economy.

The manufacturers have one great advantage over the mining shop, namely, the quality of the material used. Within recent time, there has been a notable advance in metallurgy and many alloys are now available that are particularly suited for some special use. It is obvious that a manufacturer making large quantities can have material that is best for his particular service. A mine shop, being unable to carry in stock all of the various special alloys, is apt to use material that will do, but is not the best or most economical for the purpose employed.



The MINERAL INDUSTRY and TRANSPORTATION

By CARL R. GRAY*

I MUST confess to an uncomfortable feeling that there is a degree of presumption in my attempting to address a meeting of mining men. My life experience has been wholly confined to the business of transportation by rail, and I apprehend that I am in a situation not wholly dissimilar to that of the gentleman whose highlight had been experience in the Johnstown flood, and who, on his demise and arrival in the celestial regions, was so possessed with this subject that he expatiated upon it whenever he could get together any of his fellow angels. There was a little, bald-headed, heavily whiskered man who made it a point to listen each time and at the end to indulge in an audible sniff. After several of these experiences the Johnstown man inquired as to this iconoclast, and was informed that he was Noah.

† Presented to Metal Mining Convention, American Mining Congress, Denver, Colo., Sept. 30, 1936.

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I take courage, however, in remembering the publisher of the small weekly newspaper in Kansas who carried at his masthead the following:

"This paper and the *Saturday Evening Post* have a weekly circulation of 2,971,274."

Yet I confess many pleasurable contacts with members of your industry, including numerous warm friendships with mining and smelter men, the recollection of which remains among my most cherished possessions. In my early railroad days it was my privilege to serve in an important coal mining field, where I came to know many mining and zinc smelter men, followed soon thereafter by an experience of many years in one of the greatest zinc producing fields in the world, the Joplin district, embracing portions of Kansas, Missouri and Oklahoma.

Those were the days of car shortages, when the railroads were compelled to

apportion the available cars among the shippers, a condition which at times caused us all no little anxiety. Human nature has not changed—car orders were padded for two reasons, i.e., to insure their availability when needed, and incidentally to reduce the possibilities for a competitor.

When driven to the wall to fill the many orders for cars called for by the mining and smelter men whom we served, we occasionally put lumber and other freight in the background for a few days, only to find that, like Mark Twain's first death, the situation was often "much exaggerated." However, those were joyous days; we all understood each other, and with opportunity for making or losing a few dollars lurking around every corner, we could all meet for luncheon in happy spirits. Our difficulty then was to get cars; now it is to get loads for them.

Yours is a great industry. It has

gathered into its bosom some of the strongest and most virile men of our own country and the world. There is something intensely fascinating about mining. Whatever vicissitudes you may suffer, you always have the lure of new discovery and possible new markets ahead of you. Mining has taken many of you into far-away foreign fields where, if you did not all make a fortune, you at least found much adventure. Great fortunes have been made in the mining industry in our western states, in South America, Africa, and other remote places. The experiences of the late John Hays Hammond, and those of our only living ex-President, Mr. Herbert Hoover, have fascinated many young mining men.

The mining industry is an old one. Mr. T. A. Rickard, famous mining engineer and author, who is well known to many of you, said, "The age of metals began 5,000 years ago." Since that day, the mining industry has become a vital part of our civilization, and to attempt to vision a world without even our older and simpler forms of metal would be unthinkable. Without metal, the much storied "horse and buggy days" would not have been possible of realization. No industry has drawn more heavily upon the genius and courage of America than has the mineral industry, including gas and oil. The steam engine, originally made of soft cast and hand-forged iron, revolutionized the world, and metal, together with oil, another product of the earth, has virtually recast our transportation system. Without the products of mines and oil wells, the automobile, airplane, and internal combustion locomotive, now used in moving our new streamlined passenger trains, would never have come into existence. The world's debt to the mining industry is incalculable.

Colorado, the state in which this meeting is now being held, presents interesting evidence of the close relation between rail transportation and metal mining. The major portion of the railroad mileage constructed in this state in the late 70's and through the 80's had as its primary purpose reaching the then known mineral deposits. Roughly speaking, 2,084 miles of railroad were constructed for this purpose, using differing gauges from 2 ft. up to the standard of 4 ft. 8½ inches. Subsequently some of this mileage was widened to standard gauge and fitted into through routes. Some were given a third rail so as to serve a dual purpose. Of this mileage 833 miles have been discontinued on account of depletion of the mineral supply; 1,251 miles, however, still remain.

This early railroad construction developed some glamorous figures, among whom were General William J. Palmer, David H. Moffat, and Otto Mears, the latter owning the Silverton Railroad, which will be long remembered for its silver and gold annual passes.

Preceding the railroad era came the reported discovery of gold in the Pikes Peak region in 1858, and many will remember pictures of the covered wagons

bearing the slogan, "Pikes Peak or Bust."

Arthur Ridgway, C.E., is authority for the statement that the first commercial transportation institution serving Colorado directly from the East was the "Leavenworth Pikes Peak Express" plying between Leavenworth, Kans., and Denver, the first coaches arriving in Denver May 17, 1859, after making the trip of 687 miles in 19 days. The first steam quartz mill was erected at Gregory Diggings in September, 1859, and it is said that within nine months 160 mills left the Missouri River for the Pikes Peak region.

With regard to Colorado's place in the mining world, Mr. Charles W. Henderson, supervising engineer of western field offices of the U. S. Bureau of Mines, whom most of you know, is quoted as follows:

"Colorado, through 1935, has produced more lode gold than any other state in the United States and is exceeded in total gold production only by California. It stands first in reserves, followed by Wyoming, of sub-bituminous coal, and second, after Wyoming, in reserves of bituminous coal. Colorado is first, followed by Utah, in reserves of oil shale. The U. S. Geological Survey estimates the content of oil in oil shale in Colorado at 50 billion barrels. Zinc, long mainly a by-product of complex gold-silver-copper-iron-lead-zinc ores, is a constituent of the ores of nearly every mining district in Colorado, and the reserves of zinc are large."

It is not my purpose to burden you with figures relating to production within your industry—you are more familiar with them than I possibly could be. However, there are certain evidences of an upward trend in mineral production which carries with it implications that are of interest to mining and railroad men alike. Business prosperity has for many years largely rested upon the consumption of so-called consumers' goods—those products such as food, clothing, and similar items of daily consumption. That portion of the product of your coal mines which is used for the manufacture and transportation of consumers' goods, and for heating purposes, likewise much of the gasoline used, comes under the

consumers' goods classification. Consumers' goods, while very necessary, do not add to our national wealth. The second classification, durable goods, not only add to our national welfare and happiness, but in addition add to our national wealth.

I am indebted to the publishers of *Railway Age* for a compilation of car loadings which I am sure will interest you quite as much as it has me. It brings out vividly the direction in which our further business betterment must come and why I have spoken of "consumers' goods" and "durable goods." In the past few years we have somehow come to the conclusion that America, insofar as construction was concerned, was a finished product, and that such business improvement as has come was very largely the product of government spending, the payment of the soldiers' bonus, etc. The record of railroad car loadings, which reflect the movement of all commodities, refutes this view. From the study referred to, I have separated the products most nearly related to durable goods from those related to consumers' goods, and the figures are given in the table below.

You will note that taking 1933 as 100%, durable goods movement, which includes ore, increased 25.6% in 1935 and 46.2% in 1936. On the other hand, consumers' goods movement increased but 2.5% in 1935 and 3.3% in 1936, over 1933. Your ore shipments increased in 1936, 332.8% over 1933, a most encouraging situation. The figures for 1929 deserve our careful consideration, representing as they do a production situation which we will doubtless meet again, just when, however, no one can now say with exactitude.

The car loadings for the year ending with June, 1936, fell below those for the year ending with June, 1929, as shown below:

	Per Cent			
Coal	30.4			
Forest products	53.9			
Ore	46.9			
Merchandise L. C. L.	38.7			
Miscellaneous	36.3			
All car loading	37.6			

Durable Goods	1929	1933	1935	1936
Forest Products	3,319,079	884,129	1,182,884	1,530,947
Ore	2,171,121	266,543	811,287	1,153,628
Miscellaneous	20,471,156	9,601,871	11,506,502	13,038,179
Total	25,961,356	10,752,543	13,500,673	15,722,754
Ratio		100.0%	125.6%	146.2%
Consumers' Goods				
Grain and Grain Products ..	2,501,795	1,706,508	1,537,929	1,732,282
Live Stock	1,456,068	892,179	988,217	706,341
Coal	9,041,481	5,354,506	6,153,429	6,290,082
Coke	587,210	229,138	307,556	391,060
Miscellaneous L. C. L.	13,197,149	8,481,558	8,097,590	8,090,666
Total	26,783,703	16,663,889	17,084,721	17,210,431
Ratio		100.0%	102.5%	103.3%
Grand Total	52,745,059	27,416,432	30,585,394	32,933,185
Ratio		100.0%	111.6%	120.1%

When allowance is made for the diversion of freight from railways to trucks, the distribution of commodities through the medium of transportation is yet approximately 35% below that of six years ago.

The Department of Commerce recently estimated the national income for 1936 at 60 billion dollars, this estimate falling below the figures for 1929 about 25%, or 20 billion dollars. Unfortunately, too much of our public discussion relates to the distribution of the nation's income, and too little attention is paid to increasing it. With the total national income, number of men and women employed, and volume of production yet far below the pre-depression period, it is not unreasonable to say that what we most need is a will to effect an increase in the total amount of employment and production.

I have often thought that there is a greater similarity between the transportation and mineral industries and the manufacturing industry than we have realized. The railroads really manufacture and sell passenger and freight miles. We own and maintain many manufacturing units; each car, each locomotive, and each shop, station and warehouse is merely one of the links in our manufacturing process. You gentlemen who travel much know something of the magnitude and extent of our sales task. Tariffs, advertising, publicity, and, most important, our personnel, are important adjuncts in our sales problem. I will speak of personnel later.

With the mineral industry, metallic and non-metallic, gas or oil, the question of an adequate removable mineral re-

serve takes first place. Unlike transportation and agriculture, your industry is a wasting one, and, once exhausted, it cannot be replaced. We should also keep in mind that substitution of one material for another has its limitations. The road toward exhaustion which our forests have traveled has contributed heavily to the demand for certain mineral products. As I said in the beginning of my remarks, a world without minerals would be hard to live in today.

Like the railroads, you have developed a marvelous measure of technique. One need not be a mining engineer, metallurgist, or geologist to measure the advances that are being made daily. What you mining men have done below the surface has been paralleled by your metallurgists in the separation processes. When you recover, as you do, a small fraction of an ounce of gold out of a ton of rock, you have outdone the meat packers in their reputed saving of everything but the squeal.

Burning, as we do, a certain amount of fuel oil, and more recently a limited amount of distillate in our locomotives, we have at times felt a measure of worry on reading that the known reserve of crude oil is nearing exhaustion. However, after bracing ourselves for a shock which perhaps will eventually materialize, we learn that the manufacturers of oil drilling machinery have brought out new and heavier equipment which makes exploration to depths exceeding two miles possible, putting off, at least for the present, the day of oil fuel shortage. We owe much to the genius and business courage of the machinery manufacturers; I know that they have carried the railroads over some high humps.

There is another situation common to the mineral and transportation industries. I refer to the effect of volume of business on costs. If a railroad were to cease operation entirely for a year, a tremendous sum would yet be required to maintain the property, to meet fixed charges, and to pay taxes. To a large extent these items do not change with the volume of business available, but when business drops off sharply, net earnings go down and in many cases disappear entirely, so what we really want most is business, more business.

Your situation follows very closely that of the railroads. When you cannot market your ore, your mines and smelters lie idle, but your fixed charges, including taxes, run on; coupled with these you have an even more serious maintenance problem, including pumping, ventilation and timber replacements. Like the railroads, your trained working forces are scattered and the tragedy of unemployment appears. The transportation and mineral industries have alike kept abreast of the times in developing and making use of the most advanced type of equipment. The world moves on, and invention and engineering technique gain impetus during periods of depression. Mechanical equipment becomes obsolete with time, and idleness adds to this situation.

I will close with a few words relative to the men who man the railroads and who work in and about your mines and smelters. The conditions that surround all labor have changed in the past few years. Hours of work have been materially shortened, and wages have been in-

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Legal Liability in Western States for Interference With Underground Waters by Mining[†]

By BAUER EDWIN KRAMER*

THE reopening of many old mines in western states and the increased activity in the development of new mining properties is likely to raise frequent problems when mining operations divert underground water supplies and cause a conflict of interests between mine operators and agriculturalists.

In the past, water litigation arose chiefly over the right to the use of surface streams, and problems of the balancing of interests in underground waters were relatively unimportant. In questions of surface water rights, the interests of the miner were generally paramount. The law of Prior Appropriation governing surface water rights was created by the miners to meet their especial needs, and the substantive rights that grew up in western states and were enforced by the courts were an outgrowth of local custom.

While there has never been a superabundance of water in the West, for practical purposes there was enough, in the past, to meet most needs. Agriculture was relatively unimportant and large scale irrigation was unknown. The necessity of supplementing surface supplies with extensive development of sub-surface supplies had not arisen. Under such conditions, when mining operations drained a subterranean basin or stream, the diversion was not often likely to interfere with the beneficial use of that water by others. Only when the diversion amounted to the destruction of a large or important underground supply was there likely to be a conflict between the miners and beneficial users of the water.

The subsequent history is a matter of common knowledge. The increased population and the intensive development of agriculture, with its reliance on irrigation, have made necessary the development of every available source of water supply, including underground sources, and have emphasized a need for conservation. While we may produce more and more food to care for a rapidly increasing population, it is axiomatic that we cannot increase the amount of water. The most that can be done is to conserve it and to make it available for beneficial use. Every extension of agriculture,

every new farm, every new ranch, needs its share of a limited supply, and the problem has been one of apportioning a given amount to a great demand.

The physical history has had its counterpart in legal development. More and more the trend is toward a policy of equitable distribution, and away from the old concept that water goes with the land and that he who owns the land may do with it what he will. In California this trend has been marked by the enactment of the Water Commission Act¹ in 1913 for the purpose of regulating the use of water, which is subject to such control by the state of California, and a subsequent amendment² declaring it to be the established policy of the state of California that the use of water for domestic purposes is the highest use, and that the next highest use is for irrigation.

While the Water Commission Act referred to surface waters, the belief that rights to appropriation, diversion and use of all waters should be subject to further control and limitation led, in 1928, to the adoption of a state constitutional amendment, providing:

"It is hereby declared that because of the conditions prevailing in this state the general welfare requires that the water resources of the state be put to beneficial use to the fullest extent to which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare. The

right to water or to the use or flow of water in or from any natural stream or watercourse in this state is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and such right does not and shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water..."³

The California Constitutional Provision has been upheld, and has been declared to apply to all water supplies, both surface and sub-surface.⁴ As will be seen later, this trend has had important consequences in California and is one which should be of interest to mine operators insofar as it affects their rights.

While not all western states have gone so far as California in this regard, the trend should likewise be of interest to mine operators in other western states, for several patent reasons. The increase of population of late years has been more rapid in California than in most of its neighbors. The needs of an increasing population have pushed the problem to the front. Consequently, the trend of legislation and judicial pronouncement in California may be taken as a sample of what may happen in other states when the problem becomes pressing. Moreover, much of the law of water has been pioneered in California, and it is not unreasonable to assume that other states will follow the lead.

With wide-spread activity in western mining, and the opening of mine properties, the prudent operator will consider to what liability he may subject himself if a neighboring landowner's spring goes dry as a result of the mine operations. It is the purpose of this paper to discuss some of the questions which arise when the interest of mine operators and agriculturalists⁵ conflict in their relative rights to the use or diversion of subterranean water.

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[†] Presented to the Metal Mining Convention, American Mining Congress, Denver, Colo., Sept. 1, 1936.

¹ Statutes, 1913, Chap. 586, p. 1021.

² Statutes, 1921, Chap. 329, p. 443.

³ California Constitution, Art. XIV, Sec. 3.

⁴ *Peabody v. City of Vallejo* (1935), 2 Cal. (2d) 351, 40 Pac. (2d) 486.

⁵ The term "agriculturalists" in this paper is meant to include all domestic, agricultural and other beneficial users of underground water.

To understand the law applicable to the problem, it is necessary to consider something of its development. England was so well supplied with water that disputes of this kind seldom arose, and the subject was relatively unimportant until 1843, when the case of *Acton vs. Blundell*⁶ came before the Exchequer Chamber. It concerned a suit brought by one whose wells went dry as a result of mining on neighboring land. While not the first case, its later acceptance made it by far the most important, and its doctrine became known as the "Common Law Doctrine," a distinction rarely achieved by case law as recent as this.

Chief Justice Tindall held in this case that ownership of the soil gave the miner the right to carry on a lawful business in the extracting of minerals, even though it thereby destroyed the neighboring water supply. Two potent principles of English property law came into direct conflict; the first, that ownership of the soil carries ownership of all things found there; and the second, that one must so use his own land as not to injure that of another. It was argued that the right to mine did not carry the right to drain wells which depended on a water supply common to both properties and which had been dug before mining operations were commenced. This argument carried little weight with the court. Chief Justice Tindall stated that it was easy to establish a rightful appropriation of surface waters which flow openly on the surface of the ground, but in the case of a well, the water which feeds it from neighboring soil does not flow openly, but through the hidden veins of the earth and "no man can tell what changes these underground sources have undergone in the progress of time."

Thus, the inability to prove that the water diverted by the mine was the very water that fed the well weighed most strongly with the English court. Had the science of hydrology developed at an earlier date, perhaps a different result would have been reached, but before any great development had been made in this field, *Acton vs. Blundell* was so widely accepted that its doctrine became the law of England and most of the eastern United States.

As population increased, and as new jurisdictions considered the question, it became apparent that the doctrine of *Acton vs. Blundell* was not suited to conditions in this country. Even some of those jurisdictions which had adopted the rule later reconsidered the law and lim-

ited the right of one overlying owner to extract subterranean waters to that amount which may be necessary for some useful purpose in connection with the land from which it is taken.⁷

Moreover, it has been widely recognized that the right to extract water to the damage of neighboring users does not extend where the taking is malicious,⁸ contrary to a state conservation statute,⁹ or otherwise inequitable.¹⁰

The first great test of *Acton vs. Blundell* in California came in the case of *Katz vs. Walkinshaw*,¹¹ which was heard twice in bank by the state Supreme Court. So respected was the authority of *Acton vs. Blundell*, that, while Mr. Justice Temple denied its application to Western conditions, he hesitated to expressly overrule its doctrine.

The rule applied in *Katz vs. Walkinshaw*, and which has been followed in other far Western states and in Hawaii, recognizes a correlative right of all overlying landowners to the use of underground waters common to their lands. Each overlying landowner is limited to a reasonable use, and in the case of a supply insufficient to meet the needs of all, each may take only a reasonable share. In this latter regard, the correlative rights doctrine differs from the reasonable use doctrine, which permits one overlying landowner to take all the water in a common supply, if it is reasonably beneficial to his land, regardless of the needs of other owners.

II

The first question under either of the American doctrines is whether the drainage and wasting of water incidental to mining is a "reasonable use." If drainage could not qualify as reasonable under any circumstances, it would follow that mining must always be secondary to agriculture. Such a result would be intolerable and would mean that important mining operations could be enjoined by neighboring landowners, no matter how slight the interference. This would be the converse of the injustice of the Common Law Doctrine which gave the whip-hand to the landowner with the most favorable natural situation, stronger pumps, deeper wells, without regard to the hardship on others depending on the common water supply.

The drainage of water from the soil resulting from mining operations is recognized as a reasonable use of water, even though the water itself is not put to any other beneficial use. Where water is an impediment to the commercial use of the land, or where the commercial use results in incidental drainage, ridding the land of water is using the water within the scope of the doctrine. How far that use is reasonable depends on whether the amount drained is necessary to the useful purpose to which the land is put. It is readily apparent that circumstances under which the drainage is carried out, and the effect on the natural supply on which other overlying owners depend,

will have an important effect on legal rights.¹²

These are the factors which distinguish one case from another. Because they are variables, their importance changes with new declarations of public policy. An amount of water drained and wasted by mining in 1900 and considered reasonable at that time is not necessarily reasonable in 1936, when the policy is to increase and protect domestic and agricultural uses of water.

In those states following the correlative rights doctrine, the right to drain water is subject to the further limitation that the amount taken must not exceed the proportionate share of the overlying owner. This is a test based on apportionment. This, again, involves questions of nice measurement and of variable factors. If, in 1900, several landowners had enough underground water to meet their requirements, there was no damage done by the neighboring miners' drainage of 90 percent of the total supply through mining operations. In 1936, the large agricultural holdings may have been subdivided into small farms, and the new owners in large numbers may complain of the miners' drainage, which, under later comparative standards, has become excessive. The miner is now taking more than his proportionate share, since there is no longer enough subterranean water to meet the needs of all. He can be enjoined from taking more than his share, and subjected to damages to compensate the agricultural users for the loss occasioned by the excessive drainage.

Two cases in California demonstrate how far the mine operator may become liable under the correlative rights doctrine. The first came before the District Court of Appeal in 1927.¹³ The plaintiff owned land in Tuolumne County on which was located Fales Spring, which flowed into Mormon Creek. Beneath the soil lay the bed of an ancient river, and in its porous strata water collected, supporting the surface flow of spring and creek. This natural storage reservoir or basin was retained by a natural underground dike of impervious strata which caused the water to rise in the basin and to flow from plaintiff's contact spring. The defendant conducted a placer mine adjacent to plaintiff's property which was within the area of the natural reservoir. The mineral-bearing gravel underlying defendant's land went to considerable depths, and shafts had been sunk by the defendant corporation to a depth of from 242 to 265 feet. The increase of water made mining operations difficult, and the defendant began the construction of a drain tunnel about one mile west of the mine within the boundaries of defendant's land, and in a lower elevation than the bottom of its mining shafts. Defendant expended over a half-million dollars on the construction of the drainage tunnel, and was engaged in the work of its construction for more than five years. The tunnel penetrated the natural dike, and within a short time

⁶ (1843) 12 M. & W. (Eng.) 324.

⁷ See 67 C. J., Sec. 255, p. 838.

⁸ *Gagnon v. French Lick Springs Hotel Co.* (1904), 163 Ind. 687, 72 N. E. 845.

⁹ *Hathorn v. Natural Carbonic Gas Co.* (1909), 194 N. Y., 326, 87 N. E. 504.

¹⁰ *DeBok v. Doak* (1920), 188 Iowa 597, 176 N. W. 631.

¹¹ (1903) 141 Cal. 116, 70 Pac. 663, 74 Pac. 766, 64 L. R. A. 236.

¹² *Midway Irr. Co. v. Snake Creek Tunnel Co.* (1921), 271 Fed. 157, Aff'd. 260 U. S. 596.

¹³ *Eckel v. Springfield Tunnel Co.* (1927), 87 Cal. App. 617, 262 Pac. 425.

after its completion, the spring on plaintiff's land stopped flowing. The plaintiff brought an action in the Superior Court of Tuolumne County to enjoin the interference by defendant with the natural flow of the water and for damages caused by interference during the time which the drainage tunnel was in operation. The trial court denied both the injunction and the damages asked, but ordered that should the defendant discontinue or cease mining operations for a period of 90 days, it must at its own expense place a concrete bulkhead in the tunnel which would permanently prevent any water from passing beyond the bulkhead. The plaintiff appealed to the District Court of Appeal, which reversed the trial court and held that the plaintiff was entitled to a prohibitory injunction and to damages.

The basis of the appellate court's holding was that, since both parties have correlative rights to the common underground supply, the defendant mining corporation could not legally divert more than its share from the common source. The court said:

"It is clear from the foregoing quotation, (i.e., a quotation from *Hudson v. Dailey*, 156 Cal. 617, 628) as well as from other authorities, that in this state the term 'reasonable use,' as employed therein, does not mean that one of two or more persons having correlative rights in a common supply of water may take all that is reasonably beneficial to his land, regardless of the needs of the others, as the defendant contends, but only his reasonable share thereof, if there is not enough to supply the needs of all."¹⁴

In reply to this contention of the defendant that the drainage was not intended to deprive plaintiff of his share, but that it was an incident to the operation of the mine and that success depended on this procedure, the court stated that necessity is not the sole measure of right to take underground waters, and in answer to the argument of the defendant that the relative investments of the plaintiff and defendant were highly disproportionate, the court replied:

"It may be that the defendant would derive a greater benefit from the drainage of its mine than the plaintiff receives from the use of the water flowing from the spring, but that fact is wholly immaterial. The value of a flow of 24 inches of water is in no sense unsubstantial or negligible, and it is elementary that private property cannot be taken for private use upon the ground that it is more valuable to the taker than to him from whom it is taken."¹⁵

The *Eckel* case made it clear that the measure of legal interests depends solely on whether one person having a correlative right with others to the use of subterranean waters is taking more than his share of the available supply.

A second illustrative case came before the Supreme Court of California in 1936,¹⁶ and involved unusual facts. It is of special interest to mine operators, for the reason that in this case it was not foreseen that the mining methods would cause diversion of a large amount of water. The initial diversion of the huge underground reservoir was an accident.

The plaintiffs were the owners of a tract of land in Solano County, on which was located Blue Rock Spring, long famous for its mineral waters, which were used for bathing, drinking and bottling. On the other side of the mountain, and several miles distant from the mineral spring property, was located the defendants' mine, which had been operated for many years. In order to extract ore more economically from a winze, the new mining company which had re-opened the property and was operating it, cleaned out the debris of an old tunnel on a lower elevation and started to extend it for the purpose of taking out ore by gravity from the winze higher up.

Mining operations had developed some water, but the mine operators did not anticipate what was about to happen. The extension of the low level tunnel progressed to a point slightly beyond the winze, when suddenly and without warning, the miners encountered a large rush of water, which flowed from the face and the roof of the tunnel. A blast had fractured the impervious strata which retained a large underground reservoir. After the first rush of water following the fracture, approximately 90 miner's inches of water continued to flow from the tunnel. Mining operations stopped. Within a few months after the water was struck, springs and wells on the mountain started to dry, and the Blue Rock Spring stopped flowing. The mining operations had penetrated a natural reservoir, which had supported the flow of Blue Rock Spring, and had drained the natural supply. From the time that the water was first diverted to the time of the judgment, the mining company did nothing to abate the flow of water, but permitted it to run to waste from the portal of the tunnel.

Although eminent geologists, called as expert witnesses by both sides of the case, conceded that the results of extending the tunnel could not have been foreseen, the trial court enjoined the defendants from draining more than a reasonable share of water from the common supply, and awarded damages for the unlawful diversion. On appeal to the Supreme Court of California, the judgment was affirmed. The Supreme Court conceded that:

¹⁴ *Eckel v. Springfield Tunnel Co.*, supra, p. 624.

¹⁵ *Id.*, p. 625.

¹⁶ *O'Leary*, et al. v. Herbert, et al. (Feb. 28, 1936), — Cal. (2d) —, 91 Cal. Dec. 327, 55 Pac. (2d) 834.

¹⁷ *O'Leary*, et al. v. Herbert, et al., supra, 91 Cal. Dec., p. 330.

¹⁸ *Katz v. Walkinshaw*, supra.

"There is no pretense that the work of constructing the tunnel was carelessly or negligently done. It is well settled in California, however, that the doctrine of the common law in relation to the situation here presented has been changed and modified."¹⁷

Thus, although the initial diversion by the defendants was not strictly foreseeable, and was the result of prudent mining methods, so strong was the rule of protection of correlative users of subterranean water, that they prevailed under facts which the Supreme Court of California admitted would be treated as an injury for which there would be no redress at common law.

III

It has not been the intent of this paper to suggest that the law of the *Eckel* and *O'Leary* cases is the law of all the Western states. It is the law of California, and undoubtedly would be followed in other states adhering to the correlative rights doctrine. In those states where the reasonable use doctrine maintains, it is important as indicative of a trend that may reach all states where the problem is pressing.

What can the mine operator do in places where the *O'Leary* case is law, or where it is likely to be followed? Must he operate at his peril, always subject to an injunction and to damages should mine operations tap an unknown water supply?

The result of the *O'Leary* case is that any substantial interference with the rights of other users, in excess of the reasonable share of the diverter, imposes on him the duty of abating the excess flow. This is particularly important, since it affects the question of damages which may be awarded, in addition to injunctive relief. In the *O'Leary* case, the damage to the plaintiffs was the direct result of the defendants' permitting the water to flow to waste for a period of over a year and a half, when judgment against the company was given. This depleted the natural reservoir to such an extent that it was estimated that it would take more than 10 years for rainfall to refill the natural reservoir after the bulkheading of defendants' tunnel. A contemplated loss of water for approximately 10 years in the future resulted in the awarding of more than \$20,000 in damages. Had the defendant bulkheaded the tunnel on learning of the effect on neighboring water users, it is probable that damage would have been only nominal.

It has always been the law in California that one having a right to the use of water may interfere with the rights of other users to a reasonable extent.¹⁸ If the mine operator takes seasonable steps and prevents a continuation of excessive diversion, on learning of its effect or on learning of its extent under circumstances which should warn him of its effect on neighboring water users, he can generally escape liability for damages. The *O'Leary* case imposes a duty of vigilance, not necessarily an absolute liability.

Of All Things . . .

Social security is all right, but the awkward thing about it is that you have to pay for it. . . .

President's Committee submits a program to remake the Great Plains. . . . Even the duststorms don't do things fast enough for this Administration. . . .

Maybe you don't think it pays to be a Senator. . . . Most of us can smoke a particular brand of cigarette all our lives and nobody is interested. . . . But when a Senator does it, it's different. . . . Fifteen of them are getting \$1,000 each to endorse the virtues of their "favorite" smoke. . . .

One way out of this Supreme Court controversy, it seems to us, would be to have women justices. . . . No gentleman would dare to discuss the age of a lady. . . .

A daily average of 2,300 persons ride the little subway between the Capitol and the Senate Office Building these days. . . . It has gotten so bad that they had to hire two shifts of motormen . . . each working four hours. . . .

No wonder Postmaster General Farley can't make a profit out of running the postoffice. . . . It costs about \$34,000,000 a year to handle the free mail of the various Government departments. . . . Congress spends only about \$750,000 of this sum sending out speeches of members. . . .

The next Secretary of the Interior can thank Harold Ickes for the elaborate quarters he will have. . . . The new \$15,000,000 Interior building, first public building erected by the Roosevelt administration, will have on its sixth floor the most elaborate office suite in Washington. . . . Immediately below, connected by a private elevator, concealed in a sliding closet door, is a two-room kitchen-dining suite, containing everything known to modern housekeeping. . . . The huge kitchen and cafeteria for the building is six floors below in the basement, reached by escalators and elevators. . . . The Secretary's own suite is going to be draped in blue, even to the shower curtains over the swanky sunken tub. . . . Sad thing about it all is that the present Secretary will be there, at the most, only three more years. . . .

A recapitulation of expenses and income for the past four years shows that a little over \$2 was spent for each \$1 taken in—\$28,925,000,000 vs. \$14,217,000,000. . . . The resulting \$14,708,000,000 deficit is the largest for any comparable period in the nation's history. . . . Let's see what the Jan-

uary 1, 1940, figures are before we assert that these first four years are all time record makers.

Social Security Board tells us they will pay old age pensions to 300,000 people this year . . . 100,000 reaching 65 and 200,000 dying. . . . Well, if they won't get more than the 12c paid the first beneficiary under the program, they can keep their pension. . . . We prefer to die poor. . . .

The Tennessee Valley Authority has placed all its employes on a 30-hour week basis. . . . Nothing difficult about that. . . . Uncle Sam pays the bill and the taxpayers pay Uncle Sam. . . .

The secrecy with which the Government moved its gold to the new depository at Fort Knox resembled the secrecy surrounding the arrival of a Hollywood movie queen. . . .

We're looking for the chap who wrote that song "Pennies From Heaven." . . . Has he overlooked what we're getting from the Federal Government? . . .

Newest problem for the Washington braintrusters is what to do about those 25 years between the "life begins at 40" and the "old age pensions begin at 65" stages. . . .

Talking about songs, how about "We're Always Paying Taxes" as a heartbreaking little blues number. . . .

When the Congress convened there were all sorts of predictions that the President wouldn't have a bit of opposition. . . . But we were wrong. . . . There is opposition. . . . The first House vote on an Administration measure was 404 to 1.

Remember "Brewster's Millions" and the fellow who had to spend a million dollars in a specified time. . . . He wouldn't have so much trouble nowadays. . . . The Bureau of Internal Revenue would help him out a great deal. . . .

President William Green of the AFL wasn't caught napping when the United Mine Workers expelled him from their union. . . . It seems that he played a piano even before he mined coal. . . . So now he holds a card in the Musician's Union. . . .



Horydesak.



Main Entry to Archives Building, Washington, D. C.

Horydczak

Wheels of Government

As viewed by

A. W. Dickinson

of the

American Mining Congress

THE Supreme Court—with the President's Message of February 5 calling for an increase from nine to 15 in the number of Justices if and when deemed necessary. This issue stands out with greater prominence and importance than any question which has come before the National Congress and the American people in many years. The message and the draft of a bill which was attached to it provided not only that Justices might be added to the Supreme Court but that additional Justices up to a total of 50 might be appointed to both the Supreme, and the Appellate and District Courts. The situation which has ensued has resulted in a jam in legislative procedure in the National Congress and it is felt that little will be done until some agreement or disposal is found for this issue. Other planned legislation which is now marking time is the reorganization of the Federal Departments, coal control, wage and hour legislation, low cost housing, flood control, electric power treatment, neutrality, taxation, Social Security Act amendments, business regulation and stream pollution.

The increasing number of Senators who are announcing their opposition to the President's plan for increasing the Judiciary is indicative of a long drawn out contest unless the proponents and supporters of the measure are willing to accept a compromise. By some a solution is seen in the passage of the Retirement Bill introduced by Chairman Sumners of the Judiciary Committee of the House of Representatives. This bill has passed both Houses and gone to the President for approval. It provides that Supreme Court Justices may retire at the age of 70 on full salary and that they may thereafter be assigned, if they so desire, to activity in the lesser courts at the direction of the Chief Justice of the United States. If the proponents and supporters of the President's bill will accept the Sumners bill as the action to be taken on the Supreme Court it is entirely possible that a bill reported to the Senate, carrying that part of the President's bill referring to the District and Appellate Court Justices and court procedure, would be accepted and passed. Whether this sort of a disposal would be consid-

ered proper by the country at large remains to be seen, but it would break the log-jam in legislation and allow the adjournment of the Congress at a much earlier date than now seems possible.

Hearings before the Committee on the Judiciary of the Senate, originally set for March 9, have been postponed to March 10 as the President has announced that he will discuss the Supreme Court issue over the radio on the night of March 9.

The resolution providing for a three-year extension of the power of the President to negotiate trade agreements with foreign countries has been passed by both the House and the Senate without amendment and now awaits Presidential approval. Hearings were conducted in both Houses at which Assistant Secretary of State Francis B. Sayre presented the case for the Administration. Of chief interest to the mining industries was the announced policy of the State Department in connection with the proposed negotiation of a treaty with Ecuador. In preparation for this negotiation a list of articles which may be subject to reductions in duty will be made public. If this policy is to be continued it will be a material help to producers of minerals and metals in eliminating the uncertainty which has attended the negotiation of trade agreements in the past.

While previous treaties have been pending, producers have had to go to great trouble and expense in preparing data for submission to the Committee for Reciprocity Information on the mere supposition that their interests might be in jeopardy, and much of this time and expense has been wasted. There have also been cases where an industry had every reason to believe that its product was not to be the subject of negotiations, but upon proclamation of a treaty producers have discovered that their protection had been seriously reduced.

In appearing before the Committee on Finance, Secretary Julian D. Conover, of the American Mining Congress, spoke of the case of white lead under the Belgian agreement as follows:

"The case of white lead under the Belgian agreement is an example. Although it had been clearly indicated, in hearings before Congress and elsewhere, that as a general policy concessions to any foreign country would be made as to those products for which that country was a principal source of importations, and although the list of principal imports from Belgium published by the State Department contained no reference to white lead, and hence the producers assumed that their protection was in no way endangered and did not file a statement nor make an appearance, yet when the completed treaty was proclaimed, to the extreme surprise of all concerned, it carried a reduction from 2.5 cents to 2.1 cents per pound in the white lead duty. Under the unconditional most favored nation policy, also, this reduction was extended to other countries which are large producers of this commodity."

The statements by Assistant Secretary Francis B. Sayre of the State Department before the committees of Congress did not carry positive assurance that the policy announced by the State Department in the case of the treaty with Ecuador would be continued in the future and while the bill was under debate on the floor of the Senate, the Republican Floor Leader, Senator McNary, of Oregon, entered into the following colloquy with Chairman Pat Harrison, of the Committee on Finance, who had charge of the resolution:

Mr. McNARY. Mr. President, I did not wish to interrupt the able Senator from Mississippi in his presentation today. I recall that three years ago, when the original bill dealing with this subject was before the Senate, I opposed it, and followed in debate the Senator who is now offering this joint resolution. At that time I stated on the floor of the Senate that I was very much afraid no sufficient opportunity would be given to the producers of this country to present their views when there came before the State Department the question of a hearing touching an agreement with some foreign nation.

I have had some experience along that line. I recall two years ago appearing before the State Department and the

Tariff Commission, attempting to locate the particular products that I thought might be affected by a trade agreement. I was told that the plan was general in its nature. I was not apprised that any particular product of agriculture or manufactures was to be considered. I was obliged to guess at the scope of the proposed agreement. It was very unfair.

The same experience, I think, came to all who appeared before the State Department and the Tariff Commission. The indictment was a blanket one. There was no specific statement as to the product or commodities about to be considered in the negotiations for a reciprocal-trade agreement.

I thought I heard the able Senator from Mississippi say a few moments ago that there was a modification of the former plan, so that now we might have a better understanding than we have had heretofore of the product that was about to be traded off or the duty to be modified.

Mr. HARRISON. Dr. Sayre stated before the committee, and I have heard him say privately, that those in charge of making these trade agreements had progressed with reference to their public hearings; that they thought they had previously given an opportunity to everybody to be heard, but they had issued an order that in future negotiations they would give public notice of the certain particular things and products about which they were to negotiate, and that anyone who desired to come before them with reference to those products could do so, and that nothing would be incorporated in the agreements outside of the particular articles or products enumerated.

Mr. McNARY. Mr. President, that is comforting, but not wholly complete or satisfactory. Does the record contain this promulgation which has been made by the Secretary of State, and which has just been referred to?

Mr. HARRISON. It was made by Dr. Sayre, the Assistant Secretary of State.

Mr. McNARY. But is it simply a verbal statement which was made before the committee, or is it a policy which has been announced by the Department of State?

Mr. HARRISON. It is a policy which has been announced by the negotiators appointed by the Secretary of State to negotiate these trade agreements.

The consideration of tax legislation awaits the returns of March 15 under the 1936 Revenue Act. It is thought unlikely that there will be a revenue bill before the first of April and it may not come until around the 15th of the month.

On February 19 the definition of "wages" of contract miners was the subject of a conference in the Bureau of Internal Revenue at which a representative group from the mining industries presented facts to the Bureau officials. Following a general statement by the

AMERICAN MINING CONGRESS, Mr. Walter Gordon Merritt, attorney of New York, explained the propriety of deducting the cost of explosives and certain other consumable supplies from the gross earnings of contract miners in arriving at "wages" on which Social Security Taxes are to be paid. The Bureau of Internal Revenue is expected to rule at an early date. As the result of the conference a constructive treatment of the problem is anticipated as it will save endless confusion as between the Government officials and the mining taxpayers.

The Vinson Federal Coal Control Bill has been reported by the Committee on Ways and Means and is now in the Committee on Rules of the House of Representatives. As reported the excise tax on non-code members has been increased from 13½ to 19½ percent and the further tax which is estimated will produce about \$4,000,000 a year to defray administration of the act has been reduced from 1½ to ½ of 1 percent. "Captive" mines are exempted from code membership in case production and consumption are by organizations of the same corporate identity.

In the Senate a subcommittee of the Committee on Interstate Commerce is considering the Vinson (Guffey-Vinson) Bill in executive sessions and Chairman Neely of the subcommittee has announced that presentation of material not previously placed before the committee will be accepted in written form only.

In the House there is some activity on a Federal coal marketing bill introduced by Representative Casey, of Massachusetts. The same bill has been introduced in the Senate by Senator Logan, of Kentucky.

The O'Mahoney Federal Licensing Bill has been the subject of hearings at which the position of proponents has been presented up to the present time. The hearings have been irregular in schedule and it is generally understood that the O'Mahoney bill will be overtaken by the Administration bills on wages and hours and on business regulation. It is quite generally believed that the Administration Wage and Hour Bill will be aimed at industries charged with the "sweating" of labor. It is indicated that the other bill will provide for the establishment of voluntary codes of fair practice by separate industries with the administration vested in the Federal Trade Commission and also, in part, in the Department of Commerce.

Representative Patman, of Texas, has introduced two new bills on which it is anticipated that action will be slow. The first would make it unlawful for a manufacturer to sell at retail where the effect may be substantially to lessen competition between such manufacturer and his customers, or tend to create a monopoly, or to injure, destroy or prevent competition by a customer of such manufacturer. The second bill makes it

(Concluded on page 40)

CONTROLLING FALLS

of Ground In Underground Metal Mines

By J. V. CLAYPOOL*

IT IS my intention to discuss only features of mining in the underground iron mines of the Lake Superior District, and more specifically in those mines of the Mesaba Range now operating in the vicinity of Hibbing and Chisholm, Minn. It must be realized that the conditions described do not apply to innumerable conditions to be found throughout the mining operations of the world; but by communicating our practices to others we may aid in correcting some sources of severe injuries to those engaged in underground mining.

Highly organized safety activities are maintained, periodic inspections are made, rules are set down, machinery and equipment have been successfully guarded; goggles, safety shoes, safety hats, leather mitts, and even earmuffs have been provided for the protection against injury, but none of these is adequate to prevent the more serious type of injuries that frequently result from "falls of ground."

Experience strongly indicates that intelligent knowledge of the ground, strict supervision, good timber solidly put in place, and eternal vigilance are the most effective factors in the uphill fight against these accidents.

To encourage us, let me quote a few statistics on the progress made in these mines. In 1920 there were 42 disabling falls of ground for each million gross tons of iron ore mined underground; in 1935 only 8 disabling accidents per million gross tons mined.

In the Upper Peninsula of Michigan we have the Gogebic Range, where the ore is found distributed throughout a steep, pitching formation, and lying on top of dikes of Diorite and capped by cherty iron formation. The sub-level system of mining is used here quite generally, as the sticky character of the ground aids in forming a gob that moves slowly and arches well. These workings go down to great depths; development now being close to 3,000 ft. below surface. Great pressure and weight is experienced in these mines, requiring constant and heavy timbering.

On the Vermilion Range, in northeastern Minnesota, the ore bodies lie in a deep vein, or trough, standing at a steep angle, possibly 70 to 75 degrees from the horizontal. The capping is of jasper and the walls of greenstone.

* Superintendent, Hibbing-Chisholm District, Oliver Iron Mining Co.

The ore bodies vary in width up to 300 or 350 ft. In the vicinity of Ely, where the most extensive operations of the range are conducted, the predominating system of mining is top slicing, although some of the ore is extracted by sub-level caving. These mines have been operating for a relatively long time and the present workings are under a deep mat of debris, resulting from several hundred feet of previous caving.

Although the cave moves slowly, it is necessary to protect the miner in advancing by spiling poles over the last set or two of timber. The breast is laced with timber and boards before attempting to drill it, as pressure of the gob tends to loosen chunks of the ore near the top of the breast, endangering a man working there. Beyond this, the system of mining is practically that used on the other ranges.

At Tower, Minn., ore bodies are disconnected, smaller, and distributed throughout the formation, which is similar to that at Ely. The ore is extremely hard and rigidly emplaced, conditions that permit it to be extracted by an overhand stope and back-filling method similar to that used in western and southwestern United States. This is the most radical departure from the almost standardized slicing system of the Lake Superior District.

The Mesaba Range, the one in which we are particularly interested, runs for approximately 80 miles in a northeasterly direction from Grand Rapids to Babbitt, Minn. Here the ore formation lies relatively flat and under capping of Virginia slate and glacial drift. As a general statement, the ore is found along the north edge of the formation under the glacial drift, the slate not extending that far north. A large proportion of the merchantable ore is removed by the open-pit method, but in many instances the ore lies at such depths and in small quantities that the underground method of mining is commercially advisable.

In the main trough, the ore body attains considerable depth, and here the top slicing method of mining is used on successive sub-levels, the caving of the mined-out areas producing a mat of

timber and waste material that results in a slow moving back that gives considerable warning before failure, if the adjacent caving has been complete.

At Hibbing and Chisholm there are now operating underground mines in thin ore bodies that lie to the south of the main channel. These properties are one-level mines, the average thickness being approximately 16 ft. In these mines the ore is extracted by what might be called a "parallel slicing system," rather than "top slicing," as the ore is completely removed from bottom rock to capping at this one point of the mine by the one slice. The next slice is taken parallel to the first and adjacent to it. Thus, each slice or stope is under virgin ground in the case of these one-level mines. The capping is usually a bedded, ferruginous, slaty paint-rock, varying in hardness and having very questionable adhesion between its successive layers. Just between the top of the ore and the hard back, there exists a layer of softer and more moist paint-rock. This stratum varies in thickness from a few inches to 2 ft., and aggravates the situation because it must be removed before a solid back can be obtained.

First, serious consideration should be given to the selection of captains and shift bosses who are above the average in intelligence, friendly in disposition, cool thinkers under stress, capable of obtaining strict discipline of their men without driving, and who have discovered that safety in mining is as much a part of their job as the production of ore.

It is important to have the working place well illuminated so as to be able to make a visual inspection of the back and sides at all times. There is at least one 100-watt flood lamp, and sometimes more, in the slices that permit the miner to observe the back and caves from a safer distance than was possible with only a carbide lamp.

The timber used is the best obtainable. Posts are of green Norway, jack or white pine from 7 to 12 in. top diameter; caps are of the same material from 10 up to 14 in. in diameter. Back poles are of live tamarack 8 and 10 ft. long and 3

in. at smallest diameter. Split lagging is 7 ft. long, cut from live, white cedar, and is required to be not less than 3½ in. at any point of the stick. Blocking 4 by 6 in. and wedges 12 in. in length and 4 in. wide are sawed in the shops on surface and transported to the mine in bundles. These materials not only make a better job of wedging the timber on account of having square faces, but also eliminate the necessity of the miner cutting them from old timber underground and hazarding the possible injury to his hands or legs during the operation.

For lacing above the back poles hardwood boards ¾ in. thick are used. This lumber is usually green.

On the cave sides, and also on the bottom of a slice, where it is required to come under at a later time, 42 in. diamond mesh wire fencing is used to hold back the caved material. It far surpasses the use of boards for this purpose.

In drilling preparatory to blasting a cut of ore, care must be taken to place the top holes so as not to shatter the back, especially on the cave side. Holes placed too close to the back may loosen the adhesion between the layers of slate, causing it to come down with the ore and necessitate excessive blocking above the timber. Proper placing of all other holes of the cut is important, bearing in mind the fact that the cut usually has cave on one side and solid, tight ground on the other. Study should be given to using only sufficient powder in any of the holes to do the work required, thus eliminating one cause of shaky ground.

When the cut is properly drilled one should then look over the breast set of timber and the one next to it, noting that sprags are tight between both ends of the caps, that the sprags between the tops of the posts of the sets are securely in place and cap timber is wedged tightly against the back and at the ends. The cave side of the place should be inspected, and if any pressure or weight is noticeable on the posts or caps, props should be put in for additional support. If the sets are out of plumb, new sprags should be installed.

After the holes are charged, the sequence of lighting is important; the top holes should be fired last, to lessen the shock to the capping.

The earlier the support is placed under bedded structure capping, the more effective it is in retaining the natural adhesion of the layers, but the proper time to go into the place after blasting depends a good deal on the type of ground. It is risky business to go in before the smoke has cleared sufficiently to make all parts of the room clearly visible from a safe distance and under stable timber. You, your captain, or even the contract miner, may be "dirt hungry" and anxious to get at the face again, but the hazard is too great at this point to take the chance. Ventilation in any good mine should clear the smoke in from 10 to 15 minutes; if it doesn't it will be a profitable investment to install a fan.

"Stop, look, and listen" is as good an admonition to the miner returning to his

stope after blasting as it is to the automobile driver approaching a railroad crossing. It is far more difficult to ascertain the condition of the back of a room than it is to see and hear a thundering locomotive coming down the track, and the miner should take proportionately more caution. Crackling or sound of any kind at this time is evidence of movement, and men should not be allowed to go further until it ceases, or the loose rock causing the sound has come down.

When we are satisfied that what is dangerously loose has "set off" and then waited a little while longer, as a safety factor, it is all right to start sounding the back. Commencing at the corner of the last set next to the solid side, work your way up this side to the breast, or as far as the pile of broken ore will permit, picking down the loose as you go. If it is necessary to shovel a little ore from the top of the pile to get at the face, do so, and then cut a neat hitch in the breast about 10 or 12 in. in depth, and as near the diameter of the pole to be used as is practical. The pole is then put in place, one end on the last cap just over the post, and the other in the hitch. Lacing boards can then be placed transversely along the pole and wedged against the back. Working under this protection, the sealing of the back is advanced toward the cave side of the slice until another pole, with boards above, can be installed similar to the first one. This procedure is followed until the entire back is covered, usually requiring four poles to complete the operation. If the back appears to be heavier than ordinary or shows signs of "spawling off," another pole or two should be added.

Extreme caution must be exercised at all times during this operation not to advance too fast and neglect a slab of rock that will break off when a piece further out is loosened.

The timber used for backpoles is very important; they are cut from live tamarack, 8 ft. in length, and have a top diameter of 3 in. or better. This is not split timber but is the full trunk of the smaller trees and gives a strong, tough piece of timber that will not only resist great pressure but will deflect considerable more than split lagging before breaking.

A good feature of the slaty back prevalent throughout these mines is the horizontal cleavage that forms a uniform back surface and does not require much blocking. If, however, the back does break to a rough surface, it should be blocked up tight above the poles and boards. Another aid to solid timbering in this ground is the hard bottom that is offered by the underlying rock.

The cave side must be watched continually to see that there is no movement of consequence in it following the blast, especially if it is not down tight. Often the cave may have filled above the height of the posts, but may still be open above. The last blast may have loosened rock in the back above the void. If dropping is heard or an opening is visible next to the breast corner of the

pile of ore, blocking should be done immediately to prevent a run of rock.

If the back has cracked extensively or set off to considerable height, poles or timber even 6 in. or more in diameter should be placed close together on top of the caps to support the blocking necessary. Ordinarily, the lacing boards should be close enough so as not to permit chunks of rock over 4 in. square to drop through.

With the back thus protected, a man can safely work under it while removing the ore broken by the blast, but he must still keep his eyes and ears open for any indication of strain or pressure on the timber.

As the pile of ore goes down in the process of scraping, the miner at the breast should be squaring up for the next set of timber. If he does this, he will not only accomplish it faster but it is a much safer operation than using ladders or scaffolding.

Of course, we experience conditions requiring special treatment, but under this system the miner is always protected by timber overhead, with the exception of the short time required to cut the hitch for the first back pole.

If the pillar in which the slice is located is narrow and weight from the adjacent caves has crushed it, sets should be closer spaced than the customary 5½ ft. distances, and the sides should be lagged. Lacing of the breast before drilling is sometimes resorted to if the face is particularly shaky.

As a general rule, the ore body is cut up into slicing pillars 100 ft. wide, entry being through a drift cut in it midway, running off from the tramping drift to the outer extremity of the pillar. Slicing is started at the outer end and runs for 50 ft. each way from the entry drift. The slices are 10 ft. wide and vary in height from 3 ft. on the shore lines to 18 ft. in the main ore body. If the height exceeds this greatest height, it is better and safer practice to take the ore in two slices.

When starting slicing in a new pillar in solid ground, ordinarily a room three slices wide and 100 ft. long can be opened up before the weight is sufficient to warrant blasting down. It is desirable for the room to show considerable pressure before attempting to cave it, because more difficulty results from poorly filled cave than from any other source. Assuming the room has taken weight and is judged to be ripe for bringing down, the sides and ends of the room are covered from top to bottom with the 42-in. diamond mesh fencing nailed to the timber with staples. Care should be taken to see that the borders of the fencing overlap a little so as not to allow openings to occur when pressure is exerted by the debris following the blast. When the room is quite high, posts are placed perpendicularly between the sets of the slice. These serve to distribute the pressure of the cave over the wire fencing and decrease bulging when the next slice is taken.

When operations were started in these ore bodies, the standard length of cap timber was 8 ft., but the width of the

cap was increased to 10 ft., making a room that would cave better and do it when it was desired.

After the room has been properly wired up and the door at the end of the drift blocked, the inside posts of the room and the two caps of the adjacent slice open sets are drilled and loaded for blasting. Best results come from firing first the two open set posts and caps, in the slice next to the door of the room. This same procedure is followed in blasting down each successive slice, but the wiring up is limited to just the one side and ends, as the other side is now against caved ground and will not be approached again during subsequent mining. In this case, it is only necessary to blast the rear row of posts, as these rooms are only one slice in width.

In caving the ground in these mines, weight and diagonal pressure is troublesome on the fourth and every second and third slice of a group of three successive ones, as the capping has tensile strength, enough to hold together until the third slice is blasted down, at which time it usually shears off and comes down completely.

The rebuilding and reclaiming of a slice that has fallen prematurely is a problem for special consideration, requiring supervision by the best bosses in the mine. If possible, such a room should be vacated and allowed to come to rest before work is started to remove the debris. Spiling over the last good set with stout timber is sometimes necessary, catching up the outer ends with a new set of timber when the work has advanced that far. In all cases, keep the timber well ahead of the men and lag up the sides as they go.

The transfer of ore from the breast into chutes, or loading into cars for transportation to the shaft pocket, is accomplished with scrapers and hoists. Dangerous conditions can easily arise if the miner does not use good judgment in hooking up the sheaves used to guide cables fastened to the scrapers. At first injury to men was common due to the block being attached to a post or sprag that would pull out a stick of timber, and a fall of ground on the man would result if he happened to be near this point. Also in operating the scraper, a whole set of timber may easily be hooked by the scraper and knocked down if the miner is careless in placing his tail sheave too far to right or left of the center of the breast.

Tramming tracks should be kept clean and clear of objects that might cause a derailment of cars, knocking out support timber and allowing a fall of ground to occur.

In some instances, it is the practice to drive preliminary dog drifts into portions of the mine to facilitate the handling of timber, provide better ventilation, or to explore ground that has not been completely drilled. These drifts are usually about 5 ft. wide by 7 ft. high, arched in the back and without timber. Air circulation and blasting have a tendency to loosen some of the ore in these and men are required to inspect and trim this type of drift at regular intervals.

In some coal mines of Great Britain, use is being made of "Dynamometer Props." There are at least two types. The German design makes use of a steel telescopic prop. This prop is installed where it is desired to gain information as to the movement of the back, and as pressure falls on the instrument it is recorded by the forcing of mercury from a reservoir within the prop into a graduated receptacle. Successive readings at regular intervals indicate the extent and speed of movement in the back.

Another type of instrument is constructed of steel bar, fitted telescopically into a cylinder with a coiled spring to force the ends tightly against the capping and a support of some kind resting on the bottom. As the bar is forced into the cylinder by pressure from the capping, the amount of compression of the spring is registered by a stylus tracing a line on a recording drum actuated by clockwork. Readings may be taken at regular intervals, indicating the amount of deflection and whether or not the subsidence is of uniform speed.

A new thought, that has possibilities in some ground, of aiding in the study of back control, is the stethoscope. Such a future device may be an adaptation from the ordinary physician's instrument of the same name, of greater magnitude, and probably possessing an amplifying unit capable of exaggerating any slight sound caused by movement in the back.

Devices of the kinds mentioned are, I believe, the first attempts to gain definite data on the movement of ground overhead and may some day be the means of making the "Control of Falls of Ground" an exact science, rather than trusting to the eyesight and hearing of the miner.

The Mineral Industry And Transportation

(Continued from page 23)

creased. The production of ton-miles and passenger-miles, as well as the output of your mines, per man-hour employed, has grown, and as a consequence the cost of production, in many instances, has been lowered. In spite of sporadic happenings the employment relationship has greatly improved. The character and quality of workmen has improved, and sweeping advances have been made by the mining industry in the housing and general living conditions in the mining towns and villages. I never liked the term "camp," so often used by the mining industry. The word suggests a temporary form of shelter—tents, huts, shanties. Perhaps there has been too much of that kind of shelter-place in the past. Men, women, and children deserve livable homes, a rational form of amusement, some of nature's coloring, green grass, trees, and flowers. Where it is possible to provide these, the workman and, most of all, his family, will respond.

Machinery driven by steam and electricity has taken much of the harder form of toil of the workman, giving him more time to think of the finer

things of life. As managers, we should try to participate in the hopes and desires of employees, expressing a real, as distinguished from a paternalistic, sympathy at all times with their spiritual, educational, and amusement longings. From now on a large percentage of younger workmen should come to us equipped with a high school education, and in many cases some college training, and it must be our constant endeavor to elicit their interest to the degree that they will want to make the industry their life work.

While the railroads are not permitted to engage in commercial mining—and I have no quarrel with this—it is obvious that your industry will continue, as in the past, to be dependent in a high degree upon rail transportation. I can say confidently that the railroads have not and will not disappoint you. I can say with equal confidence that the old days of car shortage and congestion are gone forever. The railroads are carrying on research in its best sense, and to a degree not commonly understood, although you are all more or less familiar with the development of lighter weight freight and passenger equipment through use of higher tensile strength metals, and the search for more efficient motive power as illustrated by the Diesel-electric and now the steam turbine-electric units. To this is added the constant research of all those industries which manufacture materials used in railroad construction and equipment.

Throughout the depression railroad service has constantly improved. Train schedules, both passenger and freight, have been accelerated and, altogether, the railroads have, in my opinion, demonstrated a high degree of courage and initiative in meeting the manifold problems which the depression brought to them in common with all industry. The day of pioneering has not passed—it is ever with us in new and interesting forms. The experience of the last few years, bitter though it has been, has taught us lessons of great value in an economic sense, thereby strengthening the ability to meet and to surmount the difficulties which still lie ahead.

Oil From Coal

Prediction that great quantities of coal will be used by the oil industry to extract motor and fuel oil was made by J. Howard Pew, President of the Sun Oil Company in his 1936 report to stockholders. He pointed out that eventual high prices for petroleum products would readily justify the extraction of "unlimited" supplies from coal.

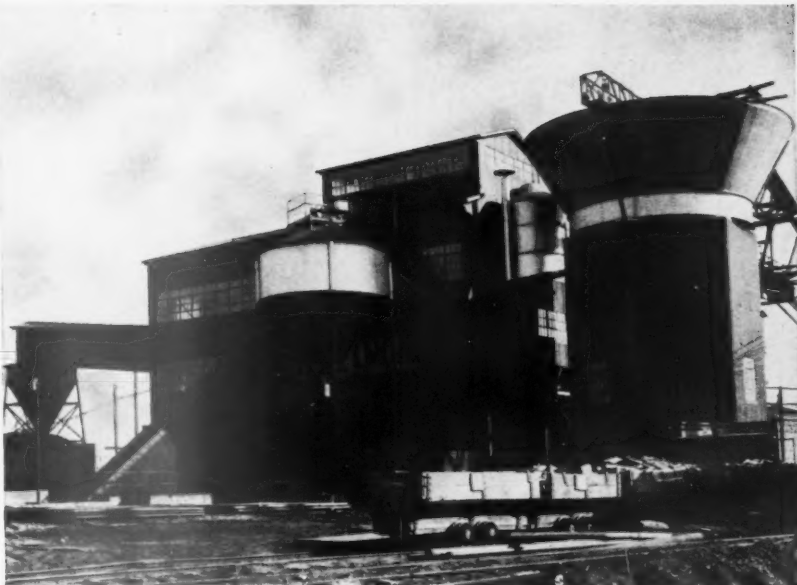
The report denies the frequently made prediction that there will be an early shortage of petroleum due to exhaustion of reserves below ground. Pew declared that new processes of recovery of petroleum from the sand, better refining methods and other commercially improved methods in operating technique in the industry were temporarily postponing the day when the oil producers would have to resort to coal as a source of gasoline and fuel oil.

Modernizing Coal Industry's Ideas

THE matter of producing quality fuels is one of the most important ones facing the coal industry today. The demand for such fuels is strongly in existence now where not so many years ago coals were assumed to be more or less of a uniform nature; often the customer's opinion then was that the coal supplied was simply either good or bad; now he demands certain results from his fuel and therefore he insists upon a certain kind and quality of coal. Much experience has taught him that his plant does not work the same with all coals.

Unfortunately a large part of the industry today still looks upon its problem as purely a mechanical one. Mining methods, mechanical layouts, labor policies and, of course, costs of mining, handling, screening and sales efforts are often considered the only important problems. The coal is assumed to be of a certain quality and the problems arising due to variations in burning characteristics, ash content, uniformity, cleanliness—in fact the very things that are important to the customer are not considered as important by many of the operators. Too often it is assumed that the coal in its raw state as mined is the one all-purpose fuel. In case of complaints the operator might blame the customer for faulty equipment or the coal salesman for not having "Sold" the customer properly, but he seldom takes the responsibility for having supplied an unsatisfactory coal. The coal is often the last thing he considers as it is assumed to be of a uniformly high grade.

We have to thank the customer for teaching us the importance of quality in fuels. From the experiences of many customers we now know that good domestic stoker fuel may not be satisfactory for certain industrial furnaces; that good domestic coal for small furnaces and stoves may not be desirable as locomotive fuel or as steam coal in certain hand-fired installations. We can no longer look upon the proximate analysis of coal as the proper way of adjudging its value for particular uses. We have



By MORONI HEINER*

come to the point where the customer's opinion is the important guide to coal quality. If he is well satisfied we know that he is obtaining coal suitable in quality and uniformity.

In line with this reasoning, the most important consideration for the coal operator today is the production of coal suitable to the varying customer demands. To do this the operator should know his product thoroughly, its possibilities of improvement and its limitations in use. He should assume that his product is the most interesting and important thing about his business—not merely the mechanical handling and disposition of it. Because customers now have a wide selection of coals and can check fuel performance so closely, he should be careful to sell his products intelligently—never oversell them. In this way only, can he always be abreast of the times and continually build customer satisfaction.

Undoubtedly much has been accomplished toward understanding the elements in coal that make for quality fuels. Research in the fundamentals of coal composition and behavior is now paving the way to a better understanding of differences observed in various plants and uses. Research has shown us that variances both in physical and burning characteristics can be largely accounted for by knowing the concentration of the component parts of the coal, vitrain to fusain. Coal sizes having concentrations of any of these components are known to react most favorably under certain conditions of burning. The swelling and coking tendencies of each component, as well as the amount and nature of the ash and the amount of moisture,

are known to be peculiar only to that one component part—not to the coal as a whole. The character and amount of the ash has been found to influence the burning characteristics of the coal. It has also been well established that the behavior of the final product can be materially altered by scientific preparation. It is, therefore, no longer true that nothing can be done to change the inherent usefulness of coal.

The increasing demand for automatic heat and smokeless fuel places new responsibilities upon the operator. The small user demands not only good combustion results from his fuel but also cleanliness and uniformity. There is here an opportunity for operators to lead the way by careful preparation, elimination of dust, and by leading in the development of smokeless fuels, as well as aiding the limitation of smoke by encouraging mechanical firing. Too often the customer holds the coal operator to be a hindrance rather than a help in making his fuel more satisfactory.

The object of the industry today should therefore be to coordinate production and sales so that coal is scientifically prepared and intelligently sold. Operators should assume that the coal as mined will need careful and scientific preparation in order to meet customer demands. In turn salesmen should represent the products in their true light, assuming that each product has definite characteristics as well as certain limitations in use. The industry will have taken a necessary and most important step forward when these facts are fully realized. In this way only, can customer satisfaction be steadily improved to the benefit of everyone concerned.

* President, Utah Fuel Company.

Use of the Oxy-Acetylene Process in the Coal Mining Industry†

By G. S. JENKINS*

REFERRING to the coal mining industry of some 15 years ago, it is of interest to note that the average mine of any considerable size would probably possess only one cutting blowpipe and perhaps one welding blowpipe. The personnel would probably include only one man who would be qualified to operate this equipment.

Coming up to the period say 10 years ago, practically no progress would be noted, although more mines might be included among those owning oxy-acetylene equipment.

However, since this time considerable strides have been made in the coal mining industry. The main cause of this progress was the variation in wage rates between certain mining districts in the United States. In some districts the operators were paying several times the wages that were paid in other districts, and yet competing in the common market. This situation caused the operators in the districts that were paying the higher wage scale to adopt some means of lowering their costs. Toward this end the coal operators adopted modernization as the means of competing with the coal from those districts in which the lower wage rate prevailed. By modernization is meant the preparing and loading of coal mechanically and the cleaning of coal mechanically. This means that the coal is mechanically undercut, mechanically drilled, shot down, mechanically loaded, hoisted and then put through a mechanical cleaning process.

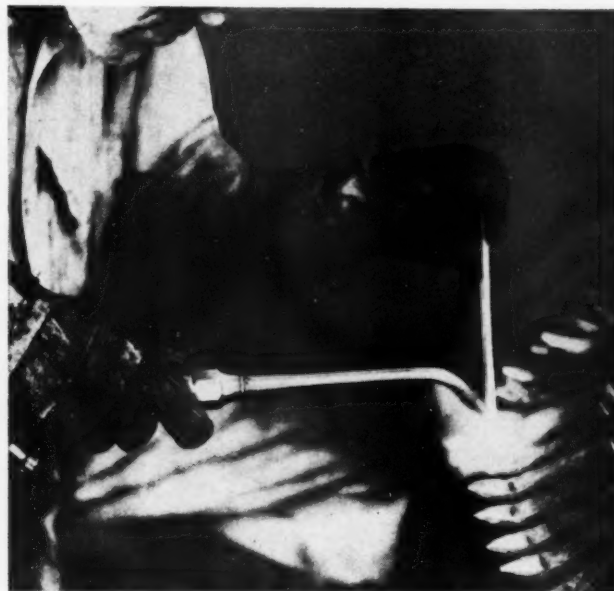
As may be easily recognized, this represented a considerable saving on the labor cost, but against such savings must be charged a considerable sum to take care of the necessary investment. Just to give an idea as to the amount of expenditures necessary to modernize a property, a rough estimate would be some \$200 per ton per day capacity. This would mean that a mine producing 1,000 tons of coal per day would have to spend approximately \$200,000 for modernization. Further, this amount would be ex-

pected to be charged off in some five or six years and the labor savings would be expected to provide this and still show some saving to the operator, in addition to the interest on the above investment.

As may be readily imagined, this additional equipment made radical changes necessary in the shop facilities. It meant the hiring of competent welders, machinists and repair men who were versed in the various processes already utilized by many industries. Practically all mines found their present machine shop facilities inadequate and were forced to enlarge them some four or five times and secure the necessary personnel for operation.

On the modernization cycle the first trend of any consequence occurred about 1928. By 1930 the trend was definitely in progress, and it has progressed rapidly since that time, until at the present time practically all the coal in those districts paying the higher wage rate is

being mined and prepared by mechanical methods, whether by deep shaft mining, slope mining or strip mining. Just to give an idea of the equipment necessary to take care of the maintenance of a modernized mine in the Illinois field, let us take the viewpoint of a visitor. As he walks around the property, he comes to the machine shop, where he will in all probability note a shop with such equipment as lathes, planers, shapers, milling machines and cutting and welding equipment. This shop will probably be manned by from 8 to 10 men engaged at the various pieces of equipment. It will be noted that a major portion of the work consists of the reclaiming of parts of the mechanical equipment. It has been the experience of mine operators that certain portions of replacement parts can be reclaimed by properly building up and remachining, at a saving of from 25 to 50 percent of the original cost. This represents a considerable sav-



Coal undercutter bits being tipped with a diamond substitute hard-facing alloy. The jig holding the bits enables the operator to handle about 650 pieces an hour.

* General Superintendent, The Consolidated Coal Company.

† Read at the 37th Annual Convention, International Acetylene Association, St. Louis, November 18, 19, and 20, 1936.

ing when one notes that the material cost in a fully modernized mine will run some 20 cents to 25 cents per ton of coal produced. While this material can not all be reclaimed, even reclaiming of 10 percent will represent a considerable figure, when one considers a production of from 3,000 to 5,000 tons daily, or even twice this amount in some cases. Considering the above figures, it may be readily seen that a saving of from \$25 to \$50 a day is easily accomplished by the reclaiming of such material as is possible.

Perhaps it might be of interest to get a bit more specific as to some of the uses of the oxy-acetylene equipment, which is considered one of the most important additions to the shop. Let us take, for example, a worn shaft. It has necessarily been replaced, due to excessive wear, which wear cannot be tolerated in conjunction with anti-friction equipment. This shaft, in all probability, is made from some alloy steel and will vary in price from \$10 to \$200. This shaft comes into the shop; its worn places are turned down and the shaft built up oversize and then remachined to the proper dimensions. After the shaft has been duly inspected and checked for fits and trueness, it is then placed in the storeroom with a tag indicating the cost of reclaiming, so that when it is again installed the charge-out will be only for the amount that was expended to reclaim it. In addition to shafts, there will be gears, gear cases, sprockets and other such items as would naturally be encountered.

Probably one of the largest savings that is realized is in the reclaiming of main frames in various large pieces of mining equipment. Were it not possible to weld these main frames, they would have to be replaced with new ones. This would mean not only the purchase of a new frame, but also the complete disassembling of the machine and the reassembling of the same. The labor and loss of use would amount to even more than the cost of the casting. However, through the oxy-acetylene process it is no longer necessary to discard a heavy frame due to fracture, as it can be welded in place with a minimum amount of disassembling work and a minimum amount of loss of use of machine. In a job of this kind it is not uncommon to have some 50 pounds or more of bronze welding rod used on a single casting. While the thought of the large amount of rod necessary, in addition to the gases needed, might appear prohibitive, upon closer inspection it would be noted that this represents probably less than 5 percent of the figure that would be involved, should a replacement have been necessary.

One of the outstanding applications developed in this industry has been the utilization of hard surfacing materials. As is very evident, considerable wear will be experienced by all machines used in the mining industry. This is brought about due to the difficulty of proper lubrication, due to excessive friction, accompanied by undue amounts of dust, and in some cases water, tending to make lubrication almost impossible in many cases.



Reclaiming a shaft by bronze-surfacing. The old threads (top) have been machined off to permit rebuilding the area (center) with bronze; the finished job (bottom) and the chip indicate the soundness of the weld metal.

As an end toward combating those evils, hard surfacing materials were resorted to, the result being that this process is now utilized to a very excessive degree. The cutting bits in an undercutting machine, which are analogous to the teeth in a saw, bear the brunt of the friction components. They are propelled through the coal on a chain at a speed of some 800 feet a minute, while the chain is forced ahead with the coal. This friction of the coal, along with the impurities encountered, give a life to these bits of from one to two tons of coal produced per bit used. By tipping these bits with hard surfacing material, their life has been increased some three or four times. To give an idea of the processes involved in the resharpening of these bits, consider the bits coming up from below in a dulled condition. The hard surfacing material is ground off and the bit then goes into a heating furnace, where it is heated to the desired temperature, after which it is rolled into shape by a bit roller. After this it is tipped with hard surfacing material and is again ready to go back into the cutting operation. Sometimes tempering and drawing is added to the operations before it goes back into service. It can be appreciated that this hard surfacing application represents a considerable saving to the mine operator, not only in bit costs, but in the saving of the time necessary to change bits in the cutting machines. The application of hard surfacing material is not limited to cutting bits, as it is utilized in practically all places where excessive wear is encountered; for example, chain guides, shaftings, machine tools, and even some places where rollers were formerly utilized are now being equipped with shoes coated with hard surfacing material, giving a sliding action instead of the former rolling action, with the life factor increase of some 200 percent, and no appreciable increase in power.

As to the use of the oxy-acetylene process in construction work, the tendency is changing to the buying of the material and fabricating it on the job.

This means not only a saving in the original price, due to the buying in carload lots of standard size structural iron, but also an increase in the speed of erection. Along these lines the structure erected is comparatively free from vibration, speedily constructed and at a minimum cost. In the construction line it might be mentioned that the assembling of lengths of pipe by welding, rather than by the screw fitting or flange fitting, results in a unit that is not only more speedily erected, but also erected at a lower cost. When utilizing this type of joint in pipes installed in bore holes, it will be noted that the absence of the sleeve gives a smaller overall diameter to the size of the casing required. This allows reduction of an inch or so in the size of the casing, or else the increase of an inch or two in the size of pipe that may be installed in a bore hole that already exists.

Another important use of the oxy-acetylene equipment is bonding and welding of rail joints underground. It may be appreciated that the constant temperature encountered in the coal mine is ideally adapted to the use of welded joint construction in the track layout. This constant temperature, that is probably between 60 and 70 degrees, means an absence of necessity for expansion joints and gives the possibility for a continuous rail, which results in a joint that will give a unity bond test when the rail is used as returned from the trolley. This construction has been used by the writer for several years with a saving of approximately 25 percent in the cost of the construction of a joint and an increase of several hundred percent in the efficiency of the joint when considered as an electrical conductor. As to the process used on this type of construction, the track is first laid and the space bars installed, after which the track is surfaced. The welding crew then enters the scene. It consists of the preparing unit and the welding unit. The preparing unit consists of the cutting blow

(Concluded on page 37)

How to Install Various Types of Splicers

By H. P. CHANDLER*



1. The type of splicer which grips the top lobe of grooved or Fig. 8 wire provides a smooth underrun for current collectors and is easy to install.

THROUGHOUT a mine it is usually necessary to use several types of splicers. The trolley wire may be either round, grooved or Fig. 8, and varies in size from 0 to 6/0. At some locations it is necessary to join wires of two sizes. Feeder systems may use stranded or solid wire, and these may vary in size from 0 to 1,000,000 circ. mil. Mining machine and locomotive cables often require splices, as do numerous other wires used in a mine.

Splicers which hold only the top lobe of either grooved or Fig. 8 wire, this design being used to give an absolutely smooth underrun and ample clearance for trolley wheels or trolley shoes, are simple to install. The splicer is slipped over the top lobe of one wire until the end of the wire is at the center of the splicer, and the set screws for gripping the wire in the splicer are tightened on this end. The other wire is then inserted in the splicer until it butts against the first wire, and the remaining set screws in the splicer are tightened. Care must be taken with this type of splicer to have the wire in perfect alignment and free from twist, so that the splicer and other fittings to which the wire is attached will not interfere with the operation of trolley wheels or shoes.

It is considered good practice to splice trolley wires before they are strung on

the overhead system and brought into tension. However, if a section of wire is to be replaced, the splicer must be installed under tension. This can be accomplished by several methods. The most common one is to pull the wires to the proper tension and to the point where they butt against each other in the splicer by attaching a wire eccentric, wedge clamp or similar device to each of the two wires and pulling them together with a block and tackle.

Another common method is to use a trolley wire tightener which employs turnbuckles to bring together clamps which are firmly attached to the wires. When the two wires have been brought into tension the splicer is slipped back over one wire, exposing the end of the wire. The other wire is then laid against the first one, a mark made to indicate where it comes even with the end of the first wire, and the slack cut. The two wire ends are then brought together and the splicer is slipped back evenly over both wire ends. When the wires are gripped by tightening the set screws or inserting the steel dogs, depending on the type of splicer used, the apparatus for holding the wires in tension is removed and the splice is completed.

Another type of splicer for trolley wires completely surrounds the wire, but uses set screws, as in the first mentioned type of splicer, to hold the wires in place. These may have a rounded underrun, or a straight line underrun. The procedure for installing them is similar to that for the top lobe splicers, but it is sometimes necessary topeen the ends of these splicers against the wire so that the current collector will have a perfectly smooth path.

Four other types of splicers, less commonly used, are the cam grip, in which the wires are gripped by the milled teeth of cams which are held down by set screws, the type in which the ends of the wire are hooked in the splicer and secured by set screws, and two sleeve types of splicers which use barbed steel dogs to hold the wire, one of which requires soldering.

The top lobe splicer is suitable for

grooved and Fig. 8 wire. The sleeve type which requires soldering is for grooved and round wire. All of the other types can be used for grooved, Fig. 8 and round wire. Most of them are available in designs permitting the joining of two sizes of wire. It is important with any



2. Three steps in splicing wires under tension. Top view—The splicer is slipped back over one wire, and the slack is measured and cut. Center view—The wire ends are brought together and the splicer is slipped back evenly over the wire ends. Bottom view—Tightening the set screws completes the splice. Note the use of two wire eccentrics and a block and tackle for holding the wires in tension.

* Development Engineer, Ohio Brass Company.

type to specify the correct size, since a much better splice can be obtained when the wire fits snugly in the splicer.

After installing these splicers another check should be made to make certain that the wire is properly aligned, and any burred ends should be filed smooth. Splicers usually require very little maintenance. On routine inspections it is well to see if the wire is being held firmly. In the set screw types, their tightness can be checked with a regular set screw wrench, as used for installing the splicers.

Feeder wire splicers are of two general types, one for stranded wire and one for solid wire. The type for stranded wire usually consists of a sleeve with an enlarged recess at the center. Cable ends are inserted and butted together at the center of the splicer. Two heavy set screws are then forced through the strands spreading them out within the enlarged center recess. The splice is completed by filling the recess with solder.

The solid wire splicer consists usually



3. Two common types of trolley wire splicers, one for gripping the top lobe of grooved or Fig. 8 wire (shown above), and one which completely incloses the wire ends.



a.



b.

4. Two types of feeder wire splicers, one for stranded copper wire (shown above), and one for solid wire in which the wires are gripped by steel dogs.

of a sleeve, in which is inserted two steel dogs, barbed on one side to grip the wire and tapered on the other side to correspond to the tapered inner wall of the splicer. The two wires are butted together within the sleeve and the steel dogs inserted. A slight pull on the wires causes the dogs to grip the wires. The splice is completed by filling the central portion of the sleeve with solder.

For splicing stranded copper cables for mining machines and locomotives a simple type of sleeve with teeth along the inner-surface is commonly used. The stripped ends of the two cables are laid side by side in the splice casting. A sharp blow on the side of the splice bends the lips around and clamps them onto the strands. The teeth in the splicer are driven into the cables, making a strong connection. This splice is completed by taping over the joint.

Several types of connectors are available for joining other wires. Most of them are of the sleeve type, and simply require the tightening of set screws to hold the wires in place.

Oxy-Acetylene In Coal Mining

(Continued from page 35)

pipe, which properly vees out the joint and prepares it for the welding unit which follows. After being properly prepared the rail is then welded in the veed joint and also along the fishplates or angle bars along the sides of the rail. This provides a joint which gives a unity bond test. It might be of interest to note that the preparing unit is mounted on a portable truck and includes not only the cutting blowpipe, but also the welding blowpipe with its various tips and the supply of the various rods necessary for the welding jobs that may be encountered. This truck may be conveyed speedily to any point when it might be needed on an emergency job with a minimum loss of time. This equipment replaces the former equipment which consisted of a cold chisel, hammer and hacksaw, and does the job in some 5 percent of the time, with accompanying reduction in labor costs. It might be observed that those items make the oxy-acetylene equipment almost indispensable.

Getting back above ground, and referring to the first part of this paper, the more modern equipped properties will have their oxy-acetylene piped to the various points of consumption through the medium of a dual pipe line system, with outlets located at the most advantageous points. This means that when a cutting or welding job presents itself, it is only necessary to connect the equipment to these outlets and proceed with the work, without the usual encumbrances of the cylinder equipment. The



Reconditioning a mine car. A dent in the end gate is heated to a cherry red with the oxy-acetylene flame and sledged back into shape without dismantling the car.

saving involved by this alone more than offsets the cost of the pipe line construction, not to mention the saving in unit cost of the generated acetylene gas, as against the cylinder acetylene gas. The writer put in the first installation with some doubt in his mind, but after a few months' use of this convenience would not dispense with it, even if the gas cost the same on the unit basis. It is estimated that the cost of generated acetylene gas is some 50 percent to 75 percent cheaper than cylinder acetylene gas.

The most recent application is the use of the oxy-acetylene cutting machine, whereby a smooth cut is effected with the minimum use of gas at a minimum loss of time. Just to mention one of its uses, is in the manufacture of switch points. In the construction of a switch point, the rail is cut to the required length and given the correct bend. After this, five distinct cuts are necessary. To do this, a jig was constructed to utilize this cutting machine. By the use of this equipment one man is able to produce approximately 40 switch points in a shift of seven hours, as against five switch points in the same time with the usual method of construction. This saving alone will pay for the machine in some 10 to 20 days at this work.

In closing, from the above mentioned uses of the oxy-acetylene apparatus it may be easily realized that the operators in the coal mining industry are strongly enthusiastic regarding the use and installation of all types of oxy-acetylene equipment.

Increase in Wages

Wage boosts equivalent to 25 cents a day were paid miners in the Tri-State Lead and Zinc District by several major mining companies beginning the latter part of February.

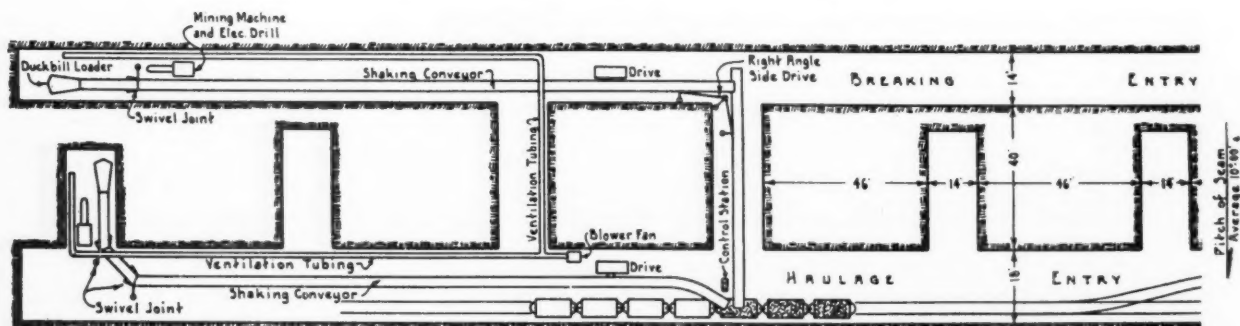
Steel Shows Increase

Scheduled operations throughout the nation's steel industry in February increased to 82.5 percent of capacity. This establishes a new high record since October, 1929.

Mechanization Trends

Reports of Coal Operators Committees

Entry Development With Conveyors



GENERAL DESCRIPTION OF OPERATION

THE system consists of driving two parallel entries. The entries are driven simultaneously with shaking conveyors as indicated by the sketch. The distance driven between set-ups is approximately 300 feet for the top entry and 300 feet plus the cross-cuts for the lower entry, as the cross-cuts are driven up the pitch from the low entry. The entries are driven from 14 to 18 feet wide, the cross-cuts averaging about 14 feet wide. The lower entry is the haulageway and air intake.

The two conveyors load directly into pit cars having a capacity of four tons. The conveyors are equipped with duckbills and swivels so as to allow free movement across the working face. As will be noted from the sketch, the coal is carried through the cross-cut to the lower entry by a side mechanism actuated by the top entry drive, the two conveyors discharging into pit cars at a common loading point. This arrangement eliminates an extra drive to convey the coal through the cross-cut to the loading point.

SEAM CONDITIONS

The seam varies from 5 feet 6 inches to 7 feet six inches, with fairly hard shale floor and sandy shale roof. In some cases where the roof does not stand up well, a coal roof is left in entries. The seam has a dip of from 4 degrees to 15 degrees.

EQUIPMENT

The conveyor equipment used to drive the pair of entries consists of two shaker conveyors each approximately 300 feet long with a separate drive unit and with a duckbill loader at the face end. In

addition there is a cross-conveyor about 60 feet long which is operated from the conveyor in the air course.

The coal is cut with shortwall mining machines to a depth of 8 feet. Drilling is done with electric coal drills and the working faces are ventilated by a blower fan with tubing. One locomotive serves the two loading units hauling an average distance of 2,500 feet with the loads. Mine cars are of four-ton capacity.

OPERATING METHODS

Three men comprise a conveyor crew for each unit, and one man at the loading head serving both conveyors. These men cut, drill, shoot and load and, when necessary, put up temporary timber. The number of man hours worked in the two entries is 49 man hours per shift, that is, seven men at seven hours each. There is also one haulage man for both conveyors, making a total of 56 man hours worked per shift.

One man on each conveyor is designated as machine runner, one as machine runner's helper, and one man does other work, getting ready for drilling, timbering, etc. Any of the crew assist in the drilling, and all help in extending the pan line when necessary. The man at the loading head assists at the face when not otherwise employed.

Bug dust is removed from the kerf, but not loaded out prior to shooting. With water on the cutter bar and the working face copiously sprinkled before shooting this method is not considered dangerous, inasmuch as the entries are rock dusted within 50 feet of the working faces and kept rock dusted.

Production averages about 15 tons per man shift of seven hours, for the daily operations, and an advance of from 12 to 15 feet is made per machine shift of

seven hours. It requires approximately 20 machine shifts to drive each place 300 feet, producing an average of 55 tons per machine shift, or 2,200 tons for the two machines between moves. Moving the conveyor 300 feet ahead requires four to eight hours time of four men for each unit, depending on the distance. Following is a resume of a typical operation for a seven-hour shift.

Size of Place	16' x 6'
Advance (in each entry)	15'
Number of men (incl. haulage in two entries)	8
Number of cuts (in each entry)	2

Time distribution for an average shift in two entries

	Man Hours
Cutting	6.73
Drilling and shooting	9.90
Extend conveyor	5.83
Timbering and dead work	6.40
Loading	20.14

Total time in entries	49.00
Gathering haulage	7.00

Total daily operation

Periodic operation consists of about 35 man hours per unit for each time the conveyor is moved.

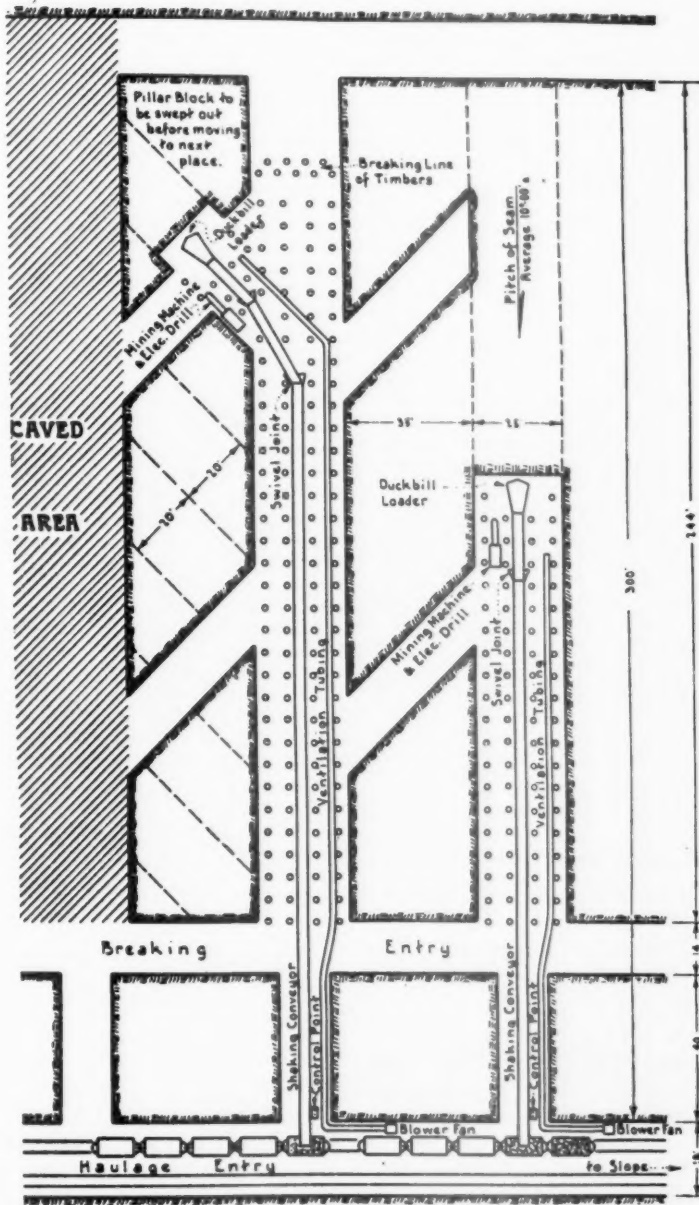
Summary for mining a complete set-up in two entries

Tonnage mined	2,604
Number of loading shifts	23
Man hours, daily operation	1,288
Man hours, periodic operations	70

Total man hours

Submitted by George B. Pryde, District Committee of Wyoming.

Room and Pillar Mining With Conveyors



GENERAL DESCRIPTION OF OPERATION

THIS report describes a battery of two conveyor units advancing two rooms and recovering the room pillars. As shown on the accompanying sketch, one room is driven to the prescribed limit and the recovery of the pillar is started before the second room is fully advanced.

The rooms are 300 feet long and 25 feet wide, with a 35-foot pillar between. Breakthroughs are driven to the right as the room advances and the pillar on the left, between the room and the mine area is recovered by a series of diagonal cross-cuts.

Each room conveyor extends from the working face to the room neck where it loads into mine cars. The arrangement of the conveyors, ventilating tubing, systematic timbering and the tracks on the haulage entry are shown on the sketch.

SEAM CONDITIONS

The seam varies from 5 feet 6 inches to 7 feet 6 inches with a fairly hard shale floor and sandy shale roof. The pitch of the seam varies from 4 degrees to 15 degrees, and the rooms are driven directly up the pitch.

EQUIPMENT

The room conveyors are the shaker type, with 25 h.p. drives, ratchet pan, ratchet and duckbill loading attachment. No gathering conveyor is used and each room conveyor loads directly into mine cars. These are of four-ton capacity and are moved at the loading point by the locomotive or by a slow speed rope hoist. One motor man serves cars to both units.

The coal is undercut by shortwall cutting machines with 8-foot cutter bars and drilled with a portable electric drill. Blower fans with ventilating tubing are used to provide adequate air at the face.

OPERATING METHOD

The unit crew in each room consists of four men. One man is designated as machine runner, one as ratchet man operating the duckbill loader, one as face man, and one as loading end man at the room neck where the conveyor loads into the mine cars.

The face is undercut, the bug dust removed from the kerf, shot holes drilled, timbers set, and after all electric power has been cut off from wires leading to the face, the holes are tamped and fired. With water on the cutter bars of the mining machines and the working faces well sprinkled before shooting, it is not considered dangerous to blast before the bug dust is loaded out.

The conveyor is extended as required. Each conveyor is equipped with a swivel so that the duckbill loader at the face end can be swung at an angle to drive the breakthroughs on the advance and the pillar crosscuts on the retreat.

The production for each conveyor unit will average about 80 tons for a seven-hour shift. The following table shows the time distribution for the crew of nine men operating the battery of two room conveyors, and the gathering locomotive during a seven-hour shift.

Time Distribution for one shift of two conveyors

	Man Hours
Cutting	6.83
Drilling and shooting	10.00
Extending conveyor	3.00
Timbering and dead work	10.77
Changing cars	2.00
Loading	23.40
Total face operation	56.00
Gathering haulage	7.00

Total daily operation 63.00
Moving conveyors requires about 35 man hours per room unit.

Summary for mining two complete rooms

Tonnage mined	7,400
Number of loading shifts	46
Man hours for daily operation ..	2,898
Man hours for moving conveyor ..	70

Total man hours 3,346

Submitted by George B. Pryde,
District Committee of Wyoming.

Wheels of Government

(Continued from page 29)

unlawful for any person engaged in commerce to make a sale of commodities or a contract for service on the understanding that the vendor thereof will in turn purchase any commodity or service from the vendee, where the effect would be to lessen competition or to create a monopoly. This would do away with reciprocity sales and service practices.

The difficulties which have arisen in the procurement of steel by the Navy have apparently been solved by the reduction in the hours of the working week by a number of steel producers. The Navy had been unable to persuade the Department of Labor to modify its practice in the administration of the Walsh-Healey Act and the situation was very embarrassing to the Government until the steel companies voluntarily brought forth the remedy.

It is understood that the proposal contained in the annual report of Secretary of the Interior Ickes affecting the mineral land laws, governing the location and patenting of mining claims, is held in abeyance for this year. It was the recommendation of the Secretary that all metals and minerals on the Federal Domain be withdrawn from entry and location, and their development placed under a leasing system similar to that now practiced in the case of oil and gas, coal and potash. The trend toward this form of handling of the minerals on the Federal Domain is strong and it is of great importance that everyone interested in mining present his views on the subject—not just once, but at intervals throughout coming months and years to his associates and to his state and congressional delegations.

American Zinc Institute, Inc., Annual Meeting

The nineteenth annual meeting of the American Zinc Institute, Inc., will be held at the Hotel Statler, St. Louis, Mo., on Monday and Tuesday, April 26 and 27.

On Monday a report of the year's activities of the Institute will be presented. Washington news as it affects the zinc industry will be interpreted. Some interesting side lights on the zinc market will be given. It is planned to present as a special feature, "The Outlook for Zinc Mining & Smelting."

The program on Tuesday will give an intimate picture of new developments on the merchandising end, and on the producing side of zinc and zinc coated products. Technical and operating men in the galvanizing division of the steel industry will share the platform and join the audience at the Tuesday sessions. While the Institute's meeting ends on the evening of the second day, April 27, the Galvanizers Committee, which is sponsored by the Zinc Institute, will carry its own program through Wednesday, April 28. Members of the Zinc Industry and their friends are invited to attend the Wednesday morning session of the Galvanizers Committee.

Foreign Trade Agreements

Statement of the American Mining Congress Before the Committee on Finance, U. S. Senate

IN THE recent hearings on the resolution to extend for three years the Trade Agreements Act of 1934, Julian D. Conover, Secretary of the American Mining Congress, made a statement to the Senate Finance Committee urging that advance notice be given to all concerned as to those commodities upon which tariff concessions to any foreign country might be contemplated. Mr. Conover said:

"The American Mining Congress, representing the various branches of the mining industry of the United States, respectfully urges that in any extension of the Trade Agreements Act of 1934, a provision be added that will specifically require that a list of all commodities or articles under consideration for the granting of concessions to any country be included in the advance public notice of intention to negotiate a trade agreement with that country.

"Such a provision in the law is of the utmost importance to producers of minerals and metals, and undoubtedly of many other commodities. In the negotiating of reciprocal trade agreements in the last three years, producers in this country have been without any knowledge or advance warning as to whether reductions in duties or other changes in their tariff protection were under consideration. This has resulted in extreme confusion and uncertainty which has been harmful to the mining industry and has tended to retard and discourage the development of mineral enterprises.

"Lacking such information, producers in many cases have had to go to great trouble and expense in preparing data for submission to the Committee for Reciprocity Information on the mere supposition that their interests might be in jeopardy, and much of this time and expense has undoubtedly been wasted. In certain cases where an industry has apparently had every reason to believe that its product was not under consideration, and for that reason has not submitted data to the committee, proclamation of the completed agreement has disclosed, to the acute distress of employers and employees in that industry, that their protection had been materially reduced.

"The case of white lead under the Belgian agreement is an example. Although it had been clearly indicated, in hearings before Congress and elsewhere, that as a general policy concessions to any foreign country would be made as to those products for which that country was a principal source of importations, and although the list of principal imports from Belgium published by the State Department contained no reference to white lead, and hence the producers

assumed that their protection was in no way endangered and did not file a statement nor make an appearance, yet when the completed treaty was proclaimed, to the extreme surprise of all concerned, it carried a reduction from 2.5 cents to 2.1 cents per pound in the white lead duty. Under the unconditional most favored nation policy, also, this reduction was extended to other countries which are large producers of this commodity.

"The case of silica sand under the same trade agreement is another example. The list of principal imports from Belgium showed no reference to this commodity, yet when the agreement was proclaimed it was found that the duty upon it had been cut in half.

"The fact that domestic producers have been completely 'in the dark' as to matters so vitally affecting their operations and their ability to employ labor has resulted in numerous protests concerning this procedure; and in its recent announcement of negotiations with Ecuador, the State Department declared that formal notice of intention to negotiate would contain 'a listing of all the items under consideration for the granting of concessions to Ecuador—in other words, all items with respect to which a reduction or binding of tariff treatment of our imports is contemplated.'

"This procedure is a distinct improvement, and one which we heartily endorse. However, it is essential to the welfare of American industry that such procedure be definitely provided by the law and not left to administrative discretion.

"We respectfully submit that Congress should unequivocally state its intention that domestic producers should thus receive adequate notice in case any tariff concession on their product is contemplated, and that employees, employers, and agricultural and other groups should then have full opportunity to present pertinent facts. A period of at least 90 days should be given for the preparation and submission of data before negotiations are undertaken.

"We suggest that an amendment to the present law, making specific provisions such as we have urged, might appropriately be made in section 4 of Public No. 316, Seventy-third Congress."

Although the resolution as subsequently adopted by the Senate was unchanged from that previously passed by the House of Representatives, statements made during the debate on the floor indicated definitely that the future policy of the State Department would be to publish a full list of commodities on which trade concessions are contemplated with any country, and not to grant concessions as to any commodity not on the list so published.

News and Views

of Interest to Mining Men

First U. S. Air Conditioned Metal Mine

INSTALLATION in the Magma Copper Mine at Superior, Ariz., of the first mine air-conditioning system with mechanical refrigeration in the United States was recently announced by Willis H. Carrier, pioneer air conditioning engineer. Speaking before a joint meeting of the Air Conditioning Bureau, the American Metallurgical Society, and several other engineering groups, Mr. Carrier outlined the installation work necessary in placing the equipment at the 3,600 and 3,400-foot levels in the mine.

The system was designed by the Carrier Corporation of Newark, N. J., to cool and reduce the humidity of the mine during all seasons. It will be used, also, to cool new portions of the mine before they are worked. Normal temperatures at present at the 3,400 and 3,600-foot levels range from 95 degrees to 100 degrees Fahrenheit, with very high humidity. The humidity, result of a high moisture content of the air, is caused by evaporation of the large amount of water found underground.

The rock temperature in the Magma mine is 10 degrees warmer at the 4,000-foot level than the Robinson Deep Mine in South Africa, also air conditioned, at 8,000 feet. In the Morro Velho Mine, Brazil, air conditioning is used to enable working when the temperature is 130 degrees.

It was pointed out that other North American mines have various methods of ventilating, but that Magma is the first to use mechanical refrigeration. The Magma mine was using a forced ventilating system, which circulates air through shafts and galleries. It was found that the high humidity factor interfered most seriously with the work of the miners and for this reason the equipment had to be designed and installed especially for maximum humidity reduction.

Two Carrier Centrifugal Compressors will provide a cooling effect equal to the use of approximately 300 tons of ice every 24 hours. One of the unusual conditions in this installation is the hot mine water in the condensers, with the abnormal temperature of 111 degrees when leaving the condensers.

Mineral Land Laws

Secretary of the Interior Ickes announced at a recent press conference, his intention to wait for a year before attempting to put into effect his recommendation for a leasing system for all minerals and metals on the Federal do-

main. The proposal in his annual report to eliminate the present method of location and proving of mineral claims had resulted in widespread protests from the mining industry which were focussed in recently adopted resolutions of the American Mining Congress.

Lead and Zinc Pigments and Zinc Salts in 1936

Preliminary statistics covering sales of lead and zinc pigments in 1936 indicate that manufacturers of these products enjoyed their best year since 1929. Sales of litharge were at record levels in 1936, the total for the year exceeding the previous record for 1929 by 9 percent and exceeding sales in 1935 by 20 percent. Sales of white lead (dry and in oil) and of red lead were the largest recorded since 1929 and were 20 and 17 percent, respectively, greater than those for 1935. Little change was made in the rate of sales of basic lead sulphate and of orange mineral in 1936. New high records were established for sales of lead zinc oxide and zinc sulphate in 1936. Totals for these products were 32 and 17 percent, respectively, above the totals for 1935. Sales of zinc oxide in 1936 were 30 percent higher than in 1935 and were the largest recorded since 1929.

Idaho Mines

Polaris Development and Mining Company is reorganizing under the name of Polaris Mining Company, a Delaware corporation. Polaris is building a mill with an initial capacity of 200 tons, which is expected to be in operation by

April 1, and can be enlarged at small cost to 400 tons. It is located between Wallace and Kellogg, near the railroad.

Construction of the Star mill will leave little ore for the Hercules Mining Company to handle at its mill in Wallace, but it is not expected this plant will remain long idle, for the Hercules Company, controlled by the "Days," has many subsidiaries in the Coeur d'Alenes, some of which it is expected will be put into production to take advantage of the high metal prices. All ore from these subsidiaries will be treated at the Hercules plant.

Another source of increased production in the Coeur d'Alenes, this year, is the Sunshine Company, which is increasing its milling capacity this summer from 600 to 1,200 tons per day.

This and production from the new Star mill and the new Polaris mill will give an increased milling capacity to the district of near 1,500 tons of ore per day. In addition, Callahan Zinc-Lead Company may get production from its Galena mine, which has a mill upon it, and from its Interstate mine, which has a small, old plant. Without counting the Callahan, milling capacity in the Coeur d'Alenes, before the end of this year, will be about as follows:

Bunker Hill, 3 mills, 2,100 tons; Bunker Hill, Crescent mill, 100 tons; Federal Mining & Smelting Company, at its Morning mine, 1,200 tons, and at its Page mine, 300 tons; Federal Mining & Smelting Company, at the Jack Waite mine, 500 tons; Sunshine Mining Company, 1,200 tons; Hecla Mining Company, 900 tons; Hercules Mining Company, 900 tons; Golconda Mining Company, 250 tons; Sullivan Mining Company, 700 tons; Polaris Mining Company, 200 tons; total maximum production, 8,350 tons per day.

Annual Meeting

The annual meeting of the Mine Inspectors' Institute of America will be held June 21-23, 1937, at the Desher-Wallick Hotel, Columbus, Ohio.



Electrified Haulage, Utah Copper Co.



C. E. COWAN
Vice President, J. H. Weaver & Co.

Early in January, C. E. Cowan, vice president, J. H. Weaver & Company, accepted the chairmanship of the Program Committee for the 14th Annual Coal Mining Convention and Exposition of the American Mining Congress. Since that time meetings have been held, questionnaires submitted to the entire coal industry, and numerous committees have been appointed. As a result of this cooperative effort a very fine program is in the making.

Serving with Mr. Cowan is W. W. Dartnell of the Valley Camp Coal Company, chairman of the Committee on Arrangements, whose duty it is to present a coordinated and smooth-running convention. The Committee on Arrangements has been divided into the following groups:

Welcome to Delegates: Co-Chairmen, Newell G. Alford, Consulting Mining Engineer, and W. H. Cordes, American Steel & Wire Company.

Attendance: Co-Chairmen, John C. Cosgrove, West Virginia Coal & Coke Company, and John Coakley, Thomas A. Edison, Inc.

Floor: Chairman, H. B. Husband, Chesapeake & Ohio Fuel Mines.

Publicity: Chairman, W. W. Rodgers, Westinghouse Electric & Manufacturing Company.

Contests: Chairman, A. W. Fisher, McGraw-Hill Publishing Co., Inc.

Entertainment: Chairman, W. D. Turnbull, Westinghouse Electric & Manufacturing Co.

State and District chairmen serving upon the Program Committee are: Pennsylvania—T. F. McCarthy, Clearfield Bituminous Coal Corp.; Ohio—F. G. Smith, Sunday Creek Coal Co.; Illinois—G. Stuart Jenkins, Consolidated Coal Co.; Indiana—W. H. Stewart, Central Indiana Coal Co.; West Virginia—E. B. Agee, Youngstown Mines Corp.; Kentucky—E. R. Price, Inland Steel Co.; Virginia—J. J. Sellers, Virginia Iron, Coal & Coke Co.; Mid West—Merl C. Kelce, Sinclair Coal Co.; Rocky Mountain District—W. C. Stark, Blue Blaze Coal Co.; Anthracite District—C. A. Garner, Jeddo-Highland Coal Co.; and Southern District—P. H. Haskell, Jr., Alabama By-Products Corp.

The exposition is "greater than ever." All space in the North and South Wings of Music Hall have long been under contract to exhibitors; the meeting room (second) floor is practically sold out; and to meet the demand the American Mining Congress will provide an annex approximately 30 ft. by 250 ft., immediately adjoining Music Hall. Space is already being allotted to exhibitors in this area. Bruce G. Shotton, Hendrick Manufacturing Company, is chairman of the Manufacturers Division, under whose auspices the exposition is held.

All committees are actively at work, and it is anticipated that this will be the largest and most successful of these important meetings.

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THE MINING CONGRESS JOURNAL

To Improve Safety

Lyman Fearn has been appointed safety engineer to improve safety conditions in the southern Wyoming coal fields. The Southern Wyoming Coal Operators' Association appointed a committee to aid in approving safety consisting of: W. B. Bryson, Colony Coal Company; G. A. Knox, Gunn-Quealy Coal Company; T. C. Russell, Diamond Coal & Coke Company; L. W. Mitchell, executive secretary of the association.

Vice Presidents Elected

General Electric Company has elected five new commercial vice presidents including: M. O. Troy, manager central station department; L. T. Blaisdell, southwestern district manager; E. H. Ginn, southeastern district manager; A. L. Jones, Rocky Mountain district manager; and T. S. Knight, New England district manager.

Vinson Coal Bill

The House Ways and Means Committee on February 15 tentatively approved the tax provisions of the Vinson Coal Bill. These provisions would impose a tax of 13.12 percent on the sale price of coal at the mine upon bituminous operators failing to comply with a code of fair competition which would be authorized by the measure. A tax of 1½ percent of the sale price of coal would be levied on all bituminous operators, the proceeds used to finance the administration program.

1937 Looks Like Banner Year for Zinc

J. E. Hayes, president of the New Jersey Zinc Company at the annual meeting of that company stated that, "since the company is a producer of semi-finish material it is dependent upon operations of heavy industries. However, if the results of the first two months are any criterion, 1937 should be a wonderful year."

Revised Handbook

The National Research Council is planning to publish this year a revised edition of the Handbook of Scientific and Technical Societies of the United States and Canada.

Public Works Construction

THE National Resources Committee has recommended to the President of the United States that the Federal Government plan and establish a six-year program for Federal public works construction. The report, which was recently transmitted to Congress recommended the creation of a coordinated public works policy and a national water program.

President Roosevelt in transmitting the report said "now is the time to develop a long-range plan and policy for construction. To provide the best use of our resources and to prepare in advance against any other emergency."

Basing its recommendations on experience of the War Department with river and harbor projects, the PWA and the Federal Stabilization Office, the National Resources Committee recommended the following:

1. Formulation and annual revision of a six-year program of Federal construction.

2. Revision and adoption of this list of approved projects by Congress.

3. A lump sum annual appropriation under regular budget procedures for expenditure on these approved projects.

4. An allocation of these funds to appropriate construction agencies by a permanent public works or development agency.

Canadian Institute

Leaders of Canadian Mining and men who played a notable part in bringing the industry to its present high position among the basic industries will gather at the Mount Royal Hotel, Montreal, on March 15, 16 and 17 for the thirty-eighth annual meeting of the Canadian Institute of Mining and Metallurgy. It is expected that some 800 delegates from all parts of Canada and United States and from the leading mining plants of every province will attend. His Excellency the Governor General will address the delegates at the dinner on Wednesday night. Other distinguished guests include the Hon. T. A. Crerar, Minister of Mines and Resources, the Hon. Maurice Duplessis, K. C. Prime Minister of Quebec, and the Hon. Onésime Gagnon, Minister of Mines for Quebec, all of whom will deliver addresses. The program will be of exceptional interest in view of the great public interest in mining, and will cover all phases of the industry.

Council of the Canadian Institute of Mining and Metallurgy have received final recommendations for Institute awards and the names of the winners will be announced at the meeting.

The Leonard medal presented by the late Col. R. W. Leonard, former president of the Engineering Institute of Canada, and awarded by that body to the author of the most outstanding paper presented during the year has been awarded to L. S. Weldon, formerly of Lake Shore mine but now in Kenya Colony, East Africa. In his absence the medal will be given by proxy to his brother, Fred E. Weldon, of St. Remi d'Amherst. Another brother, T. H. Weldon, a mining engineer at Trail, B. C., is also expected to be present.

Bureau of Mines Advisory Board

Secretary of the Interior Ickes has recently made 27 appointments from the mineral industries to membership on the Advisory Board to the United States Bureau of Mines. Those appointed are: W. R. Boyd, Jr., American Petroleum Institute; J. Thompson Brown, E. I. duPont de Nemours & Company; Thomas H. Brown, International Union of Mine, Mill and Smelter Workers; E. W. Bullard, E. D. Bullard Company; Axtell J. Byles, American Petroleum Institute; Frank L. Chase, Lone Star Gas Company; Galen H. Clevenger, U. S. Smelting, Refining & Mining Company; Julian D. Conover, The American Mining Congress; John L. Coulter, International Assoc. of Oil Field, Gas Well and Refinery Workers of America; J. D. Creveling, American Gas Association; Cleve-

land E. Dodge, Phelps Dodge Corporation; Howard N. Eavenson, Pittsburgh, Pa.; Cadwallader Evans, Jr., The Hudson Coal Company; H. C. Fremming, International Assoc. of Oil Field, Gas Well and Refinery Workers of America; Tom M. Girdler, American Iron and Steel Institute; Otho M. Graves, The General Crushed Stone Co.; William Green, American Federation of Labor; D. S. Hanley, Coal Producers Assoc. of Washington; C. K. Leith, University of Wisconsin; Eugene McAuliffe, The Union Pacific Coal Company; Louis C. Madeira, III, Anthracite Institute; Chas. F. Roeser, Petroleum Association of America; John T. Ryan, Mine Safety Appliances Company; George B. Waterhouse, Massachusetts Institute of Technology;

James P. Williams, Jr., National Coal Association; Howard I. Young, American Mining Congress; Lewis E. Young, Pittsburgh Coal Company.

Howard N. Eavenson of Pittsburgh has been chairman and Julian D. Conover of Washington, secretary of this board during the past two years.

Coeur d'Alene Production

Production by the mines of the Coeur d'Alenes in Idaho will be increased by approximately 20 percent before the end of this year. This will be accomplished by the construction of two new concentrators already well under way and by doubling the capacity of another. Sullivan Mining Company is building a 700-



GUY N. BJORGE

Howard I. Young, President, The American Mining Congress, recently announced the appointment of Guy N. Bjorge, General Manager, Homestake Mining Company, as chairman of the Program Committee for the Annual Metal Mining Convention and Exposition, to be held at Salt Lake City, Utah, September 6-10, 1937. Plans are now under way for one of the finest meetings yet held by this group. The meeting is under the auspices of the Western Division, The American Mining Congress, of which Oscar N. Friendly, Vice President and General Manager, Park-Utah Consolidated Mines Company, is chairman. A. G. Mackenzie, Secretary of the Utah Chapter of the Congress, will take an active part in the development of the convention.

Mr. Friendly has made the following appointments of committee chairmen to handle various local arrangements: General Arrangements Committee—W. J. O'Connor, American Smelting and Refining Company; Entertainment Committee—James Ivers, Silver King Coalition Mines Co.; Welcoming Committee—James W. Wade, Tintic Standard Mining Co.; Tours Committee—J. O. Elton, International Smelting & Refining Co.; Exposition Committee—J. D. Shilling, Utah Copper Co.; Publicity Committee—G. W. Snyder, W. F. Snyder & Sons Co.; and Annual Dinner Committee—E. A. Hamilton, U. S. Smelting, Refining and Mining Co. Toastmaster, W. Mont Ferry, Silver King Coalition Mines Co.

Both the convention and the exposition will be held in the Minerals Building at the Utah State Fair Grounds.

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ton plant at a point which will place it up against some of the surface buildings of the Hecla Mining Company at Burke, Idaho. It is expected this plant will be in operation by June 1, if not earlier. Sullivan Mining Company is owned 50-50 by the Bunker Hill & Sullivan Mining Company and by the Hecla Mining Company. The Star mine is owned by the Sullivan Mining Company, and all its ore is handled through the workings of the Hecla Company. It might be said that the Star mine is inside the Hecla mine, although its ground lies between the Hecla and Morning mines. For some time the Sullivan Mining Company has been milling the Star ore, which is chiefly zinc, at the Hercules mill in Wallace. At the present and pending the completion of this new mill, not much mining is being done in the Star.

Aluminum Industry in 1936

New aluminum produced in the United States during 1936 amounted to 224,929,000 lbs., valued at \$41,612,000, compared with 119,295,000 lbs., valued at \$22,070,000, in 1935, according to the United States Bureau of Mines. Production in 1936 was 89 percent greater than in 1935, and was the largest since 1930 (229,037,000 lbs.), the year of record output. The principal producing plant was that at Massena, N. Y., where approximately 41 percent of the metal made in the United States in 1936 was produced. The works at Alcoa, Tenn., accounted for 30 percent of the output, and the plants at Badin, N. C., and Niagara Falls, N. Y., contributed the remaining 29 percent.

Protest Court Plan

The Associated Press recently announced that 50 prominent Clevelanders had joined in a round-robin telegram to the Ohio Senators protesting President Roosevelt's Supreme Court proposal. Included in the 50 were many iron and steel representatives. The telegram in part said, "The legislation may have far-reaching consequences. We urge the need for full and free discussion. History proves an independent Judiciary is the essential safeguard for a people who are free and wish so to continue."

Coal Regulation

According to Charles P. O'Neill, chairman of the Appalachian group, negotiating a wage agreement with the United Mine Workers, about 25 percent of the 150 representatives attending this conference, favored enactment into law of the recently introduced coal control bill. Twenty-five percent were opposed to any form of regulation whatever while 50 percent of the operators were in favor of putting forth a compromise measure.

New Company Formed

The Red Jacket Consolidated Coal & Coke Company, Inc., and Red Jacket, Jr., Coal Company consolidated on January 1 into a new company to be known as

New Institute President



R. C. ALLEN

R. C. Allen, recently elected president of the American Institute of Mining and Metallurgical Engineers, has been identified with the engineering and mining field for many years. He is now executive vice president of Oglebay Norton & Co., Cleveland, and has been identified with the iron ore field for more than 25 years. In 1909 he was appointed state geologist and director of the Michigan Geology and Biological Survey, a position he held for 10 years. He was appraiser of mines for the Michigan Board of Tax Commissioners in 1913. During the World War he served as a member of the War Profits and Excess Profits Tax Board, and in this connection he organized and for a time headed the Division of Natural Resources of the United States Treasury.

He became vice president of the Lake Superior Iron Ore Association in 1919, and was elected president in 1930. In 1923 he joined Oglebay Norton & Co., becoming first vice president in 1924. He is now in charge of the company's mining operations.

He is president of the Saginaw Dock & Terminal Co.; vice president of the Toledo, Lorain & Fairport Dock Co.; and director of the Ferro Engineering Co., the Montreal Mining Co., and other companies associated with Oglebay Norton & Co.

He was born in Richmond, Ind., May 24, 1881, and received his A.B. and Master's Degrees from the University of Wisconsin.

the Red Jacket Coal Corporation. E. E. Ritter was elected president. The company will operate in West Virginia and Virginia.

Mt. Hope Mine Under New Management

The Republic Steel Corporation has acquired the Mt. Hope Mine formerly

owned and operated by the Brownsville Coal & Coke Company. E. B. Winning will be in charge of operations.

Option Extended

The American Metal Company, Ltd., has extended to Consolidated Coppermines Corp. an option, subject to stockholders' approval, to acquire 60,000 shares of American Metal Company common stock in exchange for Consolidated Coppermines stock. It is stated that the main purpose of this option is to furnish means by which the company may finance the construction of its own treatment plant if stockholders and directors so determine.

International Conference

An international conference of delegates from all steel-producing countries will be held in New York City, June 28-July 3, 1937. The American Institute of Steel Construction will serve as host, and this will be the sixth similar conference, but the first to be held in the United States.

Miners' Demands

United Mine Workers of America, in their negotiations with Bituminous operators of the Appalachian field to draft a new two-year wage contract, demanded shortening the present 35-hour week to 30 hours, with increases in basic wage scales from \$5.50 to \$6 a day in the North and to \$5.60 from the present level of \$5.10 in the South. Demands also included two weeks' annual vacation with pay for miners and a guarantee of 200 days' employment. Operators stated that their proposal would mean an annual increase of \$140,000,000 in wages.

Honor Awards

Six American engineers were selected by the American Institute of Mining and Metallurgical Engineers at its recent annual meeting as recipients of the highest awards for distinguished service in the fields of mining and metallurgy for 1936. Erskine Ramsay, chairman of the board and general consulting engineer of the Alabama By-Products Corporation of Birmingham, Ala., received the William Lawrence Saunders Gold Medal "for his many inventions of all kinds of machinery and equipment used in bituminous coal mining and preparation; for effecting improvements in coke making that resulted in the establishment of the steel industry in Alabama; for skill in administering large enterprises; for unceasing aid to young engineers through personal efforts and benefactions to educational institutions." Former medalists include Herbert Hoover, John Hays Hammond, Daniel C. Jackling, W. H. Aldridge, and Clinton H. Crane.

The first Anthony F. Lucas Gold Medal was presented to J. Edgar Pew, vice president of the Sun Oil Company, "for his continuation and vigorous promotion of the program of the standardization of oil field equipment; for his constant championship of the use of engineering principles and talent in oil field develop-

ment; for his able work as an administrator of a great national industrial association in bringing about a more exact national understanding of the problems of the petroleum industry."

George S. Rice, chief mining engineer at the Bureau of Mines in Washington, D. C., was awarded the certificate of honorary membership in the institute "in recognition of his distinguished services in promoting safety in mining, the introduction of the use of rock dust in bituminous coal mines, and for many improvements in mining methods and apparatus which have greatly reduced the number of explosions and other hazards in both coal and metal mines."

The Robert W. Hunt Prize for 1937 was awarded to William Floyd Holbrook, assistant chemical engineer, U. S. Bureau of Mines, Minneapolis, Minn., and Thomas L. Joseph, professor of metallurgy, Minnesota School of Mines and Metallurgy, Minneapolis, Minn., for contributing the best original paper on iron and steel in 1936, entitled "Relative Desulphurizing Powers of Blast Furnace Slags," presented at the February, 1936, meeting of the Institute.

John M. Hassler, chief engineer, southern district, Republic Steel Corp., Birmingham, Ala., received the J. E. Johnson, Jr., Award "for meritorious work in advancing the quality and preparation of raw materials for the blast furnace."

The awards were made following the annual dinner held at the Waldorf-Astoria, February 17.

Following the presentation of the medals and awards, the class of 1887, Legion of Honor, men were welcomed. The members of this year's class are Anson W. Allen, Frederick Burbidge, Eugene Coste, John Gillie, George M. H. Good, Arthur H. Lee, Jesse W. Reno, Frank C. Roberts, and Henry J. Williams.

Copper and Brass Sales

"With building expected to get in full stride by early spring and an estimate of more than 400,000 new housing units to be constructed, the manufacturers of better building materials expect 1937 to be the best year, from a sales standpoint, they have ever enjoyed," according to Bertram B. Caddle, secretary of the Copper & Brass Research Association. "Under the stimulus of Federal Housing Administration," he continued, "building is rapidly gaining momentum and quality products are being used in both new



Coal Storage.

construction and in modernization. Much of the credit for the general use of these materials is due entirely to the activities of the Federal Housing Administration.

"Briefly, here are some of the records established by our own industry in the building field in 1936:

"1. Approximately 15,000,000 more pounds of brass pipe and copper tubing for water lines were sold over that of any preceding year.

"2. Substantial increase was shown in the use of copper for roofs and for flashings, gutters and downspouts.

"3. Ten million more pounds were consumed by manufacturers of mechanical refrigeration than in any other 12 months.

"4. Twenty million feet of copper tubing were used by the manufacturers of oil burners—5,000 more than in any other year.

"5. Increased radio sales resulted in that industry consuming a record amount of copper, brass and bronze.

"6. The value of electrical products amounted to \$1,190,000,000, resulting in large tonnages of copper, brass and bronze for labor saving devices.

"The outlook for 1937 is most encouraging, and it is reasonable to believe that the sales records established by these industries in 1936 will be exceeded."

New Publications

Among publications recently released by the United States Bureau of Mines are the following:

Annual Report of the Metallurgical Division, Fiscal Year 1936—R. I. 3331.

Permissible Electrically Operated Room Hoists—R. I. 3326.

A Study of Oxidation of the Oil in Two Air-and-Air-Gas-Repressuring Projects—R. I. 3325.

Dust-Prevention Treatment of Solid Fuels—I. C. 6932.

Bureau of Mines Activities in the Field of Building Materials—I. C. 6924.

Survey of Fuel Consumption at Refineries in 1935—R. I. 3332.

Cooperative Fuel Research Motor Gasoline Survey, Summer 1936—R. I. 3335.

Application of Sand Filters to Oil-Field Brine-Disposal Systems—R. I. 3334.

Mineral Industries Survey of the United States (California, Kern County, Mojave District: The Golden Queen and Other Mines of the Mojave District, Calif.)—I. C. 6931.

Behavior of Flame Safety Lamps in Mine Atmospheres Deficient in Oxygen—R. I. 3327.

H. I. Young Addresses Tri-State Traffic Club

Howard I. Young, president of the American Mining Congress and the American Zinc Institute, was the principal speaker at the Tri-State Traffic Club's annual meeting at Joplin, Mo. Approximately 300 railroad representatives, shippers, and mining men attended.

COPPER CONSUMPTION IN UNITED STATES, BY QUARTERS (In Short Tons)

	1935				1936			
	I	II	III	IV	I	II	III	IV
Elec. mfrs.	25,000	33,000	33,750	36,250	31,250	41,250	43,000	48,250
Building	8,500	12,000	13,600	14,700	14,000	18,500	20,600	17,900
Automobiles . . .	24,000	27,000	15,000	24,300	24,000	31,500	19,000	25,500
Elec. refrig. . . .	4,200	6,500	3,400	1,200	5,500	9,000	3,000	2,400
Air con.	1,000	1,800	1,400	600	1,200	1,700	900	2,600
Exports	5,200	5,400	4,300	5,200	3,300	3,200	5,900	7,400
Total	67,900	85,700	71,450	82,250	79,250	105,150	92,400	104,050
Aver. monthly. .	22,633	28,566	23,816	27,416	26,416	35,050	30,800	34,683

(From American Bureau of Metal Statistics.)

—Personals—

L. C. Campbell, general superintendent of the Koppers Coal Company, has been appointed chairman of the Program Committee of the mining section of the National Safety Council.

T. J. Thomas, president, Valier Coal Company, was in Washington on February 24.

Howard Kegley, mining and oil editor of the Los Angeles Times, has been elected president of the Mining Association of the Southwest.

Frank N. Spencer has been elected a director of the New Jersey Zinc Company.

D. W. Buchanan, president, The Old Ben Coal Corporation; **Charles F. Hamilton**, vice president, Binkley Coal Company; and **Paul Weir**, consulting engineer, Chicago, Ill., were in New York in February.

J. D. A. Morrow, president of the Pittsburgh Coal Company, spent several weeks in Florida in February.

Harmon E. Keyes, formerly metallurgist for the Miami Copper Company, recently joined the staff of the General Engineering Company, Salt Lake City, Utah.

Norman Prudent has been appointed general superintendent of the Crescent Mining Company.

George W. Potter, vice president and general manager of the Eagle Picher Mining Company, was recently in Cincinnati, where he conferred with officials of this company.

William G. Caperton, president of the Scotia Coal & Coke Company, has been reelected president of the Smokeless Coal Operators Association.

Arthur Downing, vice president of the Monitor Coal & Coke Company, was elected president of the Logan County Coal Operators Association at its annual meeting.

Dr. Waldemar Lindgren, professor emeritus and former head of the Geology Department of the Massachusetts Institute of Technology, has been awarded the Wallaston Medal for Mineralogical Research by the Geological Society of London.

At a meeting of the board of managers of Lehigh Coal & Navigation Co., **J. H. Nuelle** was elected a manager of the company for the unexpired term of **Edward J. Fox**, deceased. Mr. Nuelle is president of New York, Ontario & Western Railway Co.

J. H. Murray has been appointed to the position of superintendent of floating equipment for the Baltimore & Ohio Railroad.

Oscar Ostby, president of Independent Anthracite Coals, Inc., has been named director of markets for the Stevens Coal Company.



Eugene McAuliffe

Eugene McAuliffe, president, Union Pacific Coal Company, presented the Saunders Medal to **Erskine Ramsay**, of Birmingham, Ala., at the meeting of the American Institute of Mining Engineers in February. Mr. McAuliffe was a Washington visitor later in the month.

H. H. Sharp, formerly assistant general manager of the El Potosi Mining Company, has been appointed a vice president of the Howe Sound Company.

C. A. Cabell, president, The Carbon Fuel Company, is in Florida, where he will remain for several weeks.

J. B. Morrow, preparation engineer, Pittsburgh Coal Company, presented a paper on "Preparation of Coal in the Pennsylvania Field" at the meeting of the Southeastern Section of the A. I. M. E., in Birmingham, on March 15.

C. E. Hough, formerly with the Koppers Coal Company, has joined the staff of the Goodman Manufacturing Company. Mr. Hough served as chairman for the annual dinner committee at the Cincinnati convention of the American Mining Congress, 1936.

Lyle Dayhoff, president of Republic Coal & Coke Company, is in Florida on vacation.

John A. Roebling's Sons Company announce the appointment of **Arthur E. Gaynor** as manager of their New York branch, succeeding **W. P. Bowman**, deceased.

Dr. Helmuth H. Schrenk has been appointed chief chemist of the Health Division of the U. S. Bureau of Mines. He succeeds **William P. Yant**, resigned, and will have his headquarters at the Pittsburgh Experiment Station.

Louis S. Cates, president of Phelps Dodge Corporation, announced the following changes in the western organization: **P. G. Beckett**, formerly vice president and general manager, has become a vice president, while **H. M. Lavender** assumes the title and duties of general manager. Both Mr. Beckett and Mr. Lavender will continue their headquarters at Douglas, Ariz.

Bell & Zoller Coal Company announce the election of **W. P. Young** to the position of vice president and general manager, in charge of operations, of the Bell & Zoller Coal and Mining Company and the Centralia Coal Company, and the appointment of **J. M. Johnston** as assistant general manager.

R. B. Renner, who has been with the Jeffrey Manufacturing Company for the last 30 years as mechanical engineer, was recently made chairman of the executive committee of the materials handling division of the American Society of Mechanical Engineers. The function of this division of the society is to spot, coordinate, and bring before the engineering public outstanding developments in conveying machinery and its use.

The board of directors of the Pittsburgh Testing Laboratory announce the election of **C. M. Houck**, formerly manager of inspection, to the office of vice president.

Ralph E. Sprenkle, manager of the Butler Consolidated Coal Company, Wildwood, Pa., died February 20, 1937.

PETER F. LOFTUS

Consulting Engineers

ENGINEERING AND ECONOMIC SURVEYS, ANALYSES AND REPORTS ON POWER APPLICATIONS AND POWER COST PROBLEMS OF THE COAL MINING INDUSTRY

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Universal Announces New Officers

The Universal Crusher Company, of Cedar Rapids, Iowa, at their annual meeting elected a new group of officers in line with their policy of expanding their activities in the field of crusher equipment, portable washing and screening plants, and accessory handling equipments.

A. W. Daniels has been elected to the office of president, and H. F. Rikhoff, secretary and treasurer. L. S. Hackney has been appointed sales manager, and L. W. Dunlap, assistant general manager.

Election of Officers

The board of directors of the Blaw-Knox Company has elected H. B. Loxterman a vice president, and Albert L. Cuff, secretary. In addition, the following officers have been elected to subsidiary companies: W. H. Eisenbeis has been made vice president of the Union Steel Casting Company, and John Baker has been made sales manager of the Union Steel Casting Company. P. M. Fleming has been made vice president and a director of the Pittsburgh Rolls Corporation.

Ground Wire Bracket for Conserving Pole Height

To provide a suitable means of supporting suspension clamps for overhead ground wires on wood pole lines, the Ohio Brass Company, Mansfield, Ohio, has developed a ground wire bracket which prevents the loss of considerable pole height. In the design of such lines, it is the usual practice to install a pole extension above the crossarm. The new fitting allows the ground wire to be attached to the pole itself, eliminating the need for an extension and using only 1½ in. of headroom. In combination with the suspension clamp commonly used with ground wires, the device sacrifices only ¾ in. of the pole height.

Aside from this major advantage, the bracket has numerous desirable mechanical features. It is made of malleable iron, hot dip galvanized, and has ultimate strengths of approximately 8,000 lb. for vertical loads and 5,000 lb. for horizontal loads.

The bracket can be furnished alone or in combination with the proper suspension clamp.

M. S. A. Forms Canadian Subsidiary

The Mine Safety Appliances Company, of Pittsburgh, Pa., recently announced the formation of The Mine Safety Appliances Company of Canada, Ltd., a new company, which took over the personnel and business of the safety department of Drummond, McCall & Company, Ltd.,

of Montreal, Quebec, well known successful merchants dealing in iron, steel, and nonferrous metals for the past 50 years. The safety department of Drummond, McCall had been the agents for The Mine Safety Appliances Company since 1918.

The new company, which is located at 802 Railway Exchange Building, 637 Craig Street, West, Montreal, P. Q., is in charge of R. Morris, former manager of the safety division of the Drummond, McCall & Company, Ltd. R. M. McColl will represent the new company in Nova Scotia, with office and warehouse at New Glasgow. Complete stocks of MSA safety equipment will be carried at Montreal, P. Q., and New Glasgow, Nova Scotia.

Since both businesses are of highly specialized character, and the complete line of The Mine Safety Appliances Company has become so highly developed during recent years, it was considered advisable by officials of both companies to establish a separate outlet to handle the safety equipment sales exclusively.

Among the popular products of The Mine Safety Appliances Company, Ltd., are Edison electric cap lamps, McCaa oxygen breathing apparatus, gas-detecting instrument, gas masks, skullgard protective hats, and Comfo respirators.

New Solid Rubber Roll Belt Carrier

Stephens-Adamson Mfg. Co., of Aurora, Ill., have gone into extensive production on their new solid rubber roll impact belt carrier as a result of their having recently developed a carrier of this type for their large installation at Inland Lime & Stone Co., Port Inland, Mich. This belt carrier is particularly



unique by reason of its heavy 1½-in. covering of vulcanized rubber extending entirely around the 2¼-in. diameter pressed steel hub of the roller, with bottom layer of the roll vulcanized to the steel hub. The solid roll is formed from numerous layers of rubber wound about the hub, each layer vulcanized to the other. The S-A impact belt carrier is

built in two styles, the normal and heavy-duty types. It is tilted to train belt without guide rollers, and the three 6-in. rollers form a 20° trough; the impact carrier can also be furnished for flat belts.

New Office Opened

The General Engineering Company has opened a laboratory and office at 823 East Van Buren Street, Phoenix, Ariz., under the charge of Harmon E. Keyes, chemist and metallurgical engineer, for the last six years research engineer for the Miami Copper Company, and for three years previously, acting superintendent for the U. S. Bureau of Mines, Tucson, Ariz.

Mr. Keyes will be the special representative of The General Engineering Company in the Arizona territory, especially with reference to exploiting patented hydro-metallurgical processes for treating copper ores and various other patents.

New Catalog

The Mosebach Electric and Supply Company, of Pittsburgh, Pa., has just published Catalog No. 3 covering their complete line of track and trolley products for coal mines, metal mines, and quarries.

In addition to seven new types of flash-weld rail bonds, the catalog features many other new products, including trolley feeder relays, wobbler type trolley sliders, mining machine ground clamps, motor lead union connectors, and other interesting and original track and trolley devices.

Copies will be sent free upon request to the manufacturer.

Jeffrey Protected Screw Take-up

A new protected screw take-up for conveyors and elevators is announced by the Jeffrey Manufacturing Company, Columbus, Ohio. The adjusting screw is protected from dust and dirt by an inverted U-shaped shield which extends from end to end of the take-up frame. The sliding base casting, which carries an adjustment nut of bronze, is cored out in such a way that it slides freely over the shield, thus relieving the shield of any function other than of protecting the screw. As the adjusting screw does not travel but remains inside the frame, it is protected from damage at all times. The screw is also protected from operating strains and shocks, in fact relieved of all load; for, after adjustment, the bearing is rigidly clamped to the rugged steel frame.

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